TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

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BERIBERI.

STANTON (A. T.). **The Control of Beri-Beri in the Far East.**—*Fifth Congress of the Far Eastern Assoc. of Trop. Med. Singapore. Sept. 1923.*—10 pp. 1923. Kuala Lumpur: F.M.S. Govt. Printing Office.

After giving an historical survey the author describes an epidemic of beriberi, which occurred in a jail, caused by cooking parboiled rice under steam pressure; when the rice was cooked in the ordinary way cases ceased to occur. He points out that the greatest practical proof of the food deficiency theory in the Far East is the great reduction of late years in the number of cases of beriberi, due to increased general knowledge of the etiology and the greater use of undermilled rice.

For prevention it is essential that there shall be an abundant supply of undermilled rice at a price not above that of white rice. Taxation and higher customs duties on polished rice are impracticable. The establishment of local mills where undermilled rice can be produced is highly commended, but they may have to be subsidized.

Education and propaganda are important.

P. W. Bassett-Smith.

BOINET. **Beriberi.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille,* 11–17 *Septembre, 1922. Comptes Rendus.* pp. 110–113.

During the war the author saw among the Indo-Chinese many cases of atrophic and paralytic beriberi similar to those observed among the Annamites in Tonkin. A case is described which, after two years of indefinite signs, was admitted to hospital and died from broncho-pneumonia. At the Hospital of the Conception, Marseilles, M. AUBE reported 17 Japanese cases of beriberi which occurred there in 1917. The ship left Yokohama in July, called at Dakar in September, and all were then free from the disease. It stopped there six days and many contracted malaria. At Marseilles cases of dry beriberi occurred, and one died. No officers were affected. The onset of the disease, apparently latent infections following reduced vitality due to malaria, is interesting.

P. W. B-S.

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BOINET & MÈGE. **Dix-neuf cas de beriberi nautique à bord d'un paquebot.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille, 11–17 Septembre 1922. Comptes Rendus.* pp. 106–110.

Among 90 Chinamen carried on a M.M. mail steamer from China that had berthed at Marseilles on the 2nd February there occurred, in June-August following, an epidemic of beriberi. On the 24th June the first death was recorded, from acute wet beriberi; on the 23rd and 24th August there were two more fatal cases. Though the onset in these cases appeared to be sudden, enquiry showed that they had been suffering from symptoms previously and had been treated by acupuncture, etc., by other learned Chinese. An inspection brought to light 16 more cases with oedema and cardiac and other characteristic signs of beriberi. These were isolated, the necessary changes in diet were made, stimulants and theobromine were given, and after fifteen days all had improved and nine were considered to be cured. The food which had been given to the Chinese on board was found to be deficient in anti-neuritic factors. The Company then gave them European rations and no fresh cases occurred.

P. W. B-S.

LICHTENSTEIN (A.). **Rapport omtrent het voorkomen van beri-beri in de garnizoenen Batavia en Meester-Cornelis in de jaren 1919 tot en met 1922.** [The Occurrence of Beriberi in the Garrisons of Batavia and Meester Cornelis in 1919–22.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 4. pp. 646–662. With 3 charts. [2 refs.]

The warning given by EIJKMAN, SCHÜFFNER, KUENEN (see this *Bulletin*, Vol. 19, p. 73), when the issue of unpolished rice in the Dutch Indian army was stopped in October 1918, is more than justified by the outbreaks of beriberi in the following years. At Batavia and Meester Cornelis the beriberi rate went up from 1·8 per 1000 in 1918 to 26 per 1000 in the first eight months of 1922 (*i.e.* 39 per 1000 per annum). Vitamin-containing additional foodstuffs are not appreciated by the native soldier and such food is not sufficient to cover the lack of B-vitamin if polished rice is used as the principal food. The re-introduction of rice containing about 0·40 per cent. P_2O_5 stopped the epidemic in question within 5 weeks.

W. J. Bais.

SUZUKI (T.). **Diagnostic radiologique du béribéri chez le nourrisson.**—*Le Nourrisson.* 1922. Mar. Vol. 10, No. 2. pp. 114–129. With 12 figs.

At autopsies of 9 infants dead from cardiac beriberi the author found that the heart was one and a half times larger than in other diseases, such as enteric, pneumonia, and tubercle, excepting only congenital heart disease. The liver and spleen are also greatly enlarged. When radiology was used in cases of infantile beriberi the same great increase in volume of the heart and liver was shown to be of considerable diagnostic and prognostic value, more particularly in acute cases. The examination showed also that in convalescence though the size greatly decreases, the heart still remains larger than in other diseases.

P. W. B-S.

MIURA (Sôichiro). **Ueber die Hirnerscheinungen im Verlauf der Säuglingsberiberi.** [The Brain Changes in Infantile Beriberi.]—*Monatsschr. f. Kinderheilk.* Leipzig. 1923. June. Vol. 26. No. 3. pp. 243–249. With 1 fig. [5 refs].

The author gives the ordinary symptoms of infantile beriberi and mentions the generally accepted belief that though the child may have all the typical symptoms, the mother shows neither subjective nor objective signs. He describes two cases, in Annamese, 6 and 8 months old, of 2 to 4 weeks' duration, dying cyanosed with heart failure. In each instance the mothers showed a slight degree of beriberi. Post mortem—sero-fibrinous meningitis, fatty infiltration and congestion of the liver, cloudy swelling of the kidneys, catarrhal pneumonia, and hypertrophy and dilatation of the heart were found. These pathological conditions are ascribed by the author to a toxic infection derived from the mother's milk.

P. W. B-S.

BOSE (S. R.). **A Note regarding Sporeforming Bacterium and Fungi growing on the Rice-Grains used by Families suffering from Beri-Beri and Epidemic Dropsy.**—*Calcutta Med. Jl.* 1923. Sept. Vol. 18. No. 3. pp. 389–393.

The investigation was carried out to determine if possible whether rice used by persons suffering from beriberi and epidemic dropsy contained infective organisms. The author found in the "diseased" rice, in apparently healthy grain, and in grain obtained from the common market in Calcutta a sporebearing organism allied to *B. subtilis*, which had a proteolytic action. It was killed by 1/1000 corrosive sublimate in under six hours. Probably this organism and moulds are merely external contaminators and their growth in culture media is due to the incomplete sterilization of the damaged rice grains, many of which are present in every sample. The author found no evidence that epidemic dropsy could be traced to changes produced in the rice grains, and the statement in the Editorial of the *Indian Medical Gazette* of Oct. 1922 that "The Problem of Epidemic Dropsy in Bengal is solved" cannot be accepted.

P. W. B-S.

NAGAYO (Mataro). **Beriberi and Rice Neuritis.**—*Jl. Amer. Med. Assoc.* 1923. Oct. 27. Vol. 81. No. 17. pp. 1435–1437.

A summary of the work done for the Beriberi Investigation Committee of the Department of War. It is chiefly a differentiation of rice disease of fowls and Chichiko (dyspepsia)* of infants from human beriberi which in Japan are considered to be distinct; though the author admits, that "it is quite probable that the eating of rice as the main diet may in itself contribute a factor to the occurrence of beriberi and administering vitamin B may produce good results in preventing and curing human beriberi."

P. W. B-S.

* Develops after feeding with a substitute of milk prepared with rice.

KAWAKIYA (Shintarō), SUZUKI (Susumu) & KAGOSHIMA (Shigeru) [**Ueber die Reiskrankheit des Säugetieres.**] [Rice Disease of Mammals.]—*Ni. Byor. Gak. K.* Tokyo. 1921. Vol. 11. pp. 104–108. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 1. p. 3.]

The experiments were made on 64 puppies three to four months old. The diet was rich in carbohydrates but poor in vitamin B. The symptoms did not appear for about three months, but the illness was acute, with loss of appetite, cramps, pains and hyperglycaemia. The hearts were not hypertrophied, both sides being equal, but there was general atrophy with oedema, some hypertrophy of the suprarenals, and catarrhal changes in the digestive tract. The observations in general correspond with those seen in rice sickness of birds.

P. W. B-S.

OGATA (Tomosaburo), KAWAKITA (Shintaro), SUZUKI (Susumu), & KAGOSHIMA (Shigeru). [**Beiträge zur Kenntnis der Reiskrankheit des Geflügels.**] [Rice Disease in Birds.]—*Ni. Byor. Gak. K.* Tokyo. 1921. Vol. 11. pp. 83–103. [Summarized in *Japan Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 1. p. 4.]

It is maintained that rice sickness and beriberi are distinct. Examination of soya beans for protective properties showed that the fresh or dried coagulated bean albumen was very good, but if frozen and dried, or fermented, its action was almost negative. The vitamin activity of the urine as described by MÜCKENFUSS was not confirmed.

P. W. B-S.

RANDOIN (L.) & SIMONNET (H.). **Influence de la nature et de la quantité des glucides présents dans une ration privée de facteur B sur la précocité de l'apparition des accidents de la polynévrite aviaire.**—*C. R. Acad. Sci.* 1923. Nov. 5. Vol. 177. No. 19. pp. 903–906. With 1 chart.

FUNK and others have ascribed the symptoms of vitamin B deficiency disease to the excessive quantity of carbohydrate intake relative to the amount of vitamin B present, and FUNK observed that when glucose formed a high percentage of the diet the results were more marked. The authors' experiments show that in pigeons the symptoms are very rapidly produced when glucose or dextrin forms a high percentage of the diet ; birds fed upon potato starch (fécule) remained healthy for over three months. The results depend not only upon the amount of the carbohydrate but upon the proportion utilized by the digestive organs. The authors conclude also that the vitamin requirement is not absolute, fixed, and dependent on the animal itself, but that it is directly related to the amount of food assimilated, more particularly sugar. Curves of weight show the rapid fall when an excess of sugar was given, and the steady line in those fed upon the potato starch.

P. W. B-S.

SCURVY.

NASSAU (Erich) & MEYER (Olga). **Ueber die klinische Wirksamkeit einiger antiskorbutischer Nahrungsmittel.** [The Clinical Action of Certain Antiscorbutic Foods.] *Deut. Med. Woch.* 1923. Aug. 3. Vol. 49. No. 31. pp. 1016–1017. [3 refs.]

The observations were made at the Berlin clinic on about 50 infants suffering from moderate or severe scurvy. Many forms of vegetable foods were used, either as juice added to raw milk or made into purée. Efficacy was estimated by the time required to clear up symptoms, though this did not always mean cure of the disease, for the diathesis remains and relapses may occur. They showed that the symptoms disappeared in slight cases in less than 8 days with cherries, tomatoes, and turnips ; in 8 to 10 days with strawberries, currants, and bilberries ; in 10 to 14 days with gooseberries and lemons ; and in 14 days with raw milk. Results were negative with rhubarb, salads and red and white cabbage. The salads and cabbage were quickly given up as of little use [they were steamed, pressed, and the juice given to the children]. Lemon juice was not satisfactory [probably because old lemons were used]. The unheated milk of town cows was least useful ; 500 cc. or more was given daily. Improvement after treatment was first shown by a change of voice and increased cheerfulness ; in 5–10 days the appetite increased and evidence of dystrophy disappeared.

[The inefficacy of salads, cabbage, and lemon juice is rather remarkable, but the children are said to have disliked the carrot, cabbage, and salad juice and possibly did not take enough.]

P. W. Bassett-Smith.

PESCHIĆ (Svetosar). **Skorbut als infektiöse Krankheit. Die grosse Skorbutepidemie im Jahre 1917.** [Scurvy as an Infectious Disease.]—*Ztschr. f. Klin. Med.* 1923. Vol. 97. No. 1–3. pp. 169–181.

The author from his experience during the war concludes that scurvy is an infectious intestinal disease with an incubative period of about 7 days, the exciting cause being probably a bacillus of the colon group (" *B scorbuti* "); that it is spread in particles of excrement, either directly or through water ; and that it can be combated successfully by the hygienic measures suggested by this theory—of which, however, he offers no experimental proof, his conclusions being based chiefly on epidemiological data, though the faeces of 40 cases were investigated bacteriologically.

[It is probable that intestinal bacteria played a very important rôle in the spread of scurvy (over 2,000 cases) in the land forces during the early part of 1917 ; McCARRISON and others have shown that intestinal bacterial infections are commonly present where vitamins are deficient.]

P. W. B-S.

ZILVA (Sylvester Solomon). **The Influence of Reaction on the Oxidation of the Antiscorbutic Factor in Lemon Juice.**—*Biochem. Jl.* 1923. Vol. 17. No. 3. pp. 410–415. With 3 text figs. [7 refs.]

In these experiments the relation of oxidation and reaction to the inactivation of the anti-scorbutic factors was investigated. All the experiments were made with guineapigs, and charts demonstrate the results. It was found that in decitrated lemon juice, the destruction of the factor is due to a process of oxidation which proceeds rapidly in alkaline solutions and slowly in acid media. Under anaerobic conditions alkaline reactions seem to have no inactivating influence, while in the presence of air when the Hydrogen-ion concentration is raised, the destruction of the anti-scorbutic potency is delayed.

P. W. B-S.

ZILVA (Sylvester Solomon). **A Note on the Conservation of the Potency of Concentrated Antiscorbutic Preparations.**—*Biochem. Jl.* 1923. Vol. 17. No. 3. pp. 416–417. [2 refs.]

It has been shown that decitrated lemon juice in a concentrated form has a therapeutic value in the treatment of infantile scurvy ; but these concentrated preparations deteriorate on keeping and are therefore less valuable for prophylaxis. By the method of preparation now described a stable concentrated solution can be made which, as shown by animal experiment, remains potent for over three months. The method is to deacidify, concentrate, make slightly acid, and preserve anaerobically.

P. W. B-S.

LIOTTA (Domenico). **Sullo scorbuto sperimentale. Nota II.—L'influenza della costipazione intestinale nello sviluppo dello scorbuto.**—*Arch. di Farmacol. Sperim. e Sci. affini.* Rome. 1923. July 1. Year 22. Vol. 36. No. 1. pp. 1–5. [6 refs.]

From clinical examination and pathological findings of experimental scurvy in guineapigs, the author concludes that the factor of constipation must be absolutely excluded from the contributory causes of death. Neither in the control guineapigs nor in the others systematically purged was there any abnormal dilatation or obstruction of the caecum nor any evidence that purges or disinfectants had any influence in preventing the haemorrhagic symptoms.

P. W. B-S.

LIOTTA (Domenico). **Sullo scorbuto sperimentale. Nota III. Le modificazioni emoleucocitarie.**—*Arch. Farmacol. Sper. e Sci. affini.* Rome. 1923. Sept. 1. Year 22. Vol. 36. No. 5. pp. 76–80. [15 refs.]

The weekly examination of two guineapigs with experimental scurvy showed a slight progressive reduction of the red cells and haemoglobin with a slight rise in the total leucocyte count, and changes in the relative white count, viz. progressive increase in the mononuclears and eosinophiles. These changes are ascribed to alterations in the endocrine organs dependent upon the condition of avitaminosis, the eosinophilia probably to some abnormal disintegration of proteins.

[The cellular constituents of the blood of guineapigs often vary greatly from time to time, and the total white count found in these two cases (5,900 & 5,200) is unusually low.]

P. W. B-S.

BESSESEN (D. H.). **Changes in Organ Weights of the Guinea Pig during Experimental Scurvy.**—*Amer. Jl. Physiol.* 1923. Jan. 1. Vol. 63. No. 2. pp. 245–256.

The animals tested were divided into six groups, each fed upon the same scorbutic diet for 5, 10, 15 and 19 days before being killed. Those of the fifth group died from the disease after 21 to 54 days (a very long period) ; those of the sixth group, after 19 to 22 days, were cured by appropriate diet. The changes in the carefully weighed organs were compared with normals worked out by BESSESEN & CARLSON in 1922. The paper is interesting but is too full of detail to be adequately abstracted. Generally speaking it confirms the work of McCARRISON. In most cases for the first 15 days the changes were comparatively slight, but when scorbutic symptoms became evident the organs most altered were the suprarenals which increased from 78 to 270 per cent. The spinal cord, lungs, kidneys, testicles and hypophyses were also increased in weight. The results found in scurvy and starvation are to a certain extent explainable as due to inanition, but there are marked differences in some organs, indicating that the scorbutic condition involves factors producing changes in weight differing from those found in ordinary inanition.

P. W. B-S.

UNDULANT FEVER.

CANTIERI (Collatino). **Polisierosite e febbre di Malta.**—*Riforma Med.* 1923. July 16. Vol. 39. No. 29. pp. 680–683. [12 refs.]

The occurrence of multiple serous effusions is common in tuberculosis, and has been found in typhoid infections. The author now describes a case of undulant fever in a man aged 21 in which a similar condition was present.

He had a history of typhoid and malaria during the war. In April 1922 he had pain in the left hypochondrium, followed in 10 days by an intermittent and remittent fever, attended with headaches, sweats, articular pains, and enlarged spleen. Serum reactions for T, A and B were negative, but positive for *M. melitensis* 1/500. Lungs normal, no T.B. Urine negative. After 35 days an apyretic period occurred. There was a double pleuritic effusion for which he was tapped; the fluid contained mostly lymphocytes. The belly was tumid with some fluid. The fever was of an undulant type. In September there was right orchitis with pain, and the spleen was still enlarged. The serum remained strongly positive for *melitensis*, but the cuticular reaction was negative. On 13th January the general condition was good, but with slight pulmonary signs; the testicle was normal.

Was this a tubercular condition or was the serositis due to the *melitensis* infection? The character of the fever, the serum reactions, and late orchitis were in favour of the latter. A similar but fatal case has been reported by TOZZI and is quoted rather fully by the author.

P. W. Bassett-Smith.

ORPEN (L. J. J.). **A Method of Blood Culture in Undulant (Malta) Fever and other Diseases.**—*S. African Med. Rec.* 1923. July 28. Vol. 21. No. 14. p. 325.

The author describes the following method, which he has found to be very successful, for isolating *M. melitensis* from the blood. 10 cc. of blood are citrated, twice centrifuged with normal saline solution, and the red cells and organisms taken up in a pipette. 1 cc. is added to a tube of agar at 40° C. which is then poured into a petri dish. Four plates are made and incubated at 37° C. The organisms can be picked off for identification from the second to the sixth day. This method he finds to be better than the ordinary broth culture, or blood-clot method of TIZZANI.

[BASSETT–SMITH does not consider TIZZANI's method to be the best.]

P. W. B-S.

MONTAGNANI (M.). **L'intradermoreazione nel tifo, paratifo A e B e nella febbre melitense con i filtrati di cultura. (Contributo clinico e sperimentale.)**—*Riv. Crit. di Clin. Med.* 1923. Apr. 5. & 15. Vol. 24. Nos. 10 & 11. pp. 149–156; 161–163. [33 refs.]

The author states that the logical conclusions to be drawn from a careful study of the intradermal reaction, chiefly from the clinical and practical point of view, are the following:—

1. There is a very clear and profound difference between the intradermal reaction produced by tuberculin in tuberculous cases,

and that given by filtered cultures as recommended by BURNET, whether of the typhoid or melitensis groups, in enteric and undulant fevers.

2. Contrary to the views of BURNET he holds that the reactions produced by the filtrates are not specific, as severe reactions may be produced in other morbid conditions and even in healthy persons of any age.

3. The difference in the results depends not only on the quality but also on the quantity of the filtrate used.

4. An intradermal reaction, if it be positive, does not confirm, or if a negative, does not disprove with certainty a suspected diagnosis, and it is therefore impossible to accept these reactions as of real practical value.

[No doubt further independent studies will be carried out to determine whether BURNET or Montagnani is correct.]

P. W. B-S.

TRENTI (Enrico). **Reazione cutanee nell' infezione da micrococco melitense.**—*Policlinico.* Sez. Prat. 1923. Sept. 24. Vol. 30. No. 39. pp. 1249–1254. [14 refs.]

The author reviews the diagnostic methods which have been proposed for undulant fever with particular reference to the intradermal test of BURNET. He describes the technique used and applied it to three groups of cases.—(1) Animals infected experimentally. (2) Human cases of undulant fever. (3) Cases of other diseases. In the first he found positive reactions from the tenth day after inoculation and lasting about 30 hours. In the second group of 9 cases, the intradermal tests was positive in all, agglutination was positive in seven, blood culture was positive in the six tested. In the third group of 70 cases, all were negative. He concludes that the introduction intradermally of 0·05 to 0·1 cc. of a filtrate of a twenty days' growth of broth culture gives an absolutely diagnostic reaction for undulant fever in man and guinea-pig. The procedure is of easy application, free from risk, and should be specially useful in detecting healthy carriers.

[These results support the observations of BURNET and are in direct opposition to those of MONTAGNANI.]

P. W. B-S.

BURNET (Et.). **Evolution et manifestations chroniques de l'infection à *M. melitensis*, en particulier d'après la maladie expérimentale du cobaye.**—*Arch. Inst. Pasteur de Tunis.* 1923. July. Vol. 12. No. 2. pp. 213–221. [6 refs.]

In guineapigs after infection with *M. melitensis* there is a septicaemia complicated with osteitis, arthritis, orchitis, and evidences of suppuration; in the liver, lungs and spleen granulomata form which become caseous or turn to abscesses. It was the author's object to show the evolution of these phenomena. After the inoculation of 100 million *M. m.* he recovered the organism on the 3rd day from the blood, glands and spleen; on the 8th day from the blood and organs, and agglutination was 1/80; on the 11th day agglutination was 1/200, the organism was present in the blood and glands but not in the urine; on the 18th. day all the glands were large, spleen congested, grey and white nodules were found in the liver and spleen, and cultures were positive. This is

the period of arrest and fixation of the microbe. This state lasts several months. The nodules in the liver and lungs are very typical and the animal is ill. After 6–8 months the great majority of the guineapigs are strong and big. The young suffer most, like those infected with tubercle, but the *M.m.* does not kill guineapigs ; laboratory deaths are due to secondary infections. After 12 to 16 months the post-mortem appearances are as if a cure was being effected.

The results differ from those found in man and goats, but a study of them helps to complete our knowledge of the disease in man and goats, especially as the early stages are known only in monkeys.

In inoculated goats during the first few days the organism is not found in the blood but is present in the spleen, where it multiplies and then is distributed, causing a secondary septicaemia. In the spleen and glands the organism is slowly destroyed, being found last in the milk. In man and guineapigs it is eliminated in an irregular manner in the urine. In man the spleen is most affected ; the high fever signifies a greater resistance and more active destruction of the microbe in the blood ; the septicaemic phase is more marked and more contested and the localization in the tissues reduced to a minimum.. In goats the fever is less marked and localization takes place mostly in the mammary gland. Guineapigs are the most sensitive, the septicaemia establishes a general glandular infection with the formation of nodules in which the organism is killed, and the animal appears to recover, but, as in chronic tuberculosis, it still remains infected.

P. W. B-S.

EVANS (Alice C.). **Experimental Abortion in a Cow produced by Inoculation with** *Bacterium melitensis.—Public Health Rep.* 1923. Apr. 20. pp. 825–826.

A pregnant heifer was inoculated intravenously with one slope in 10cc. of saline solution of a human strain of *M. melitensis.* The animal aborted in six weeks ; the organism was recovered from the stomach, intestines, and peritoneal fluid of the foetus and also from the colostrum. The recovered strain is said to have been similar to that inoculated. The blood serum of the heifer agglutinated in low dilutions (1/10 & 1/20) both *melitensis* and *abortus* before inoculation, but afterwards to 1/300, practically equal to both. This rise in the agglutinins to about an equal titre and the resemblance of the infection to that which would have been produced by a bovine strain of *B. abortus* point to the identity of the organisms.

P. W. B–S.

BURNET (Et.). **Quelques faits relatifs à la possibilité de vacciner la chèvre contre le** *Micrococcus melitensis.—Arch. Inst. Pasteur de Tunis.* 1923. July. Vol. 12. No. 2. pp. 205–212. [3 refs.]

The author carried out tests on the young of healthy mother goats to see whether immunity could be produced by prophylactic inoculations. No immunity was obtained. From the many experiments made it was found that though the micrococcus was rarely found from the 112th to the 230th day post mortem, it was occasionally detected in the kidney. The view is held that the micro-organism is very difficult to eradicate from infected goats, as it remains hidden in certain centres.

P. W. B-S.

BURNET (Et.). **Réactions irrégulières au filtrat de bouillon de culture chez les chèvres infectées de** *Micrococcus melitensis.*—*C.R. Acad. Sci.* 1923. Aug. 6. Vol. 177. No. 6. pp. 414–416.

On the assumption that if the intradermal reaction found in man and guineapigs was also reliable in goats, it would be a very valuable test, the author carried out a number of experiments. He injected the filtered culture near the upper eyelid, or beneath the ear so as to demonstrate the oedema of a positive reaction. The results were very inconstant; in some animals it was very marked, in others (proved by blood culture, lacto-reaction, and serum agglutination, to be at the time infected) *it was negative.* He divides the results into three groups —(1) Positive serum agglutination and dermo-reaction, 2·5 per cent. (2) Negative agglutination and positive dermo-reaction, 9·5 per cent. (3) Positive serum agglutination and negative dermo-reaction, 3·3 per cent. The author concludes that in the present condition of our knowledge the dermo-reaction is not a practical test for the infection of goats, but he notes that those goats which received a suitable dose of the filtered culture had a temperature reaction, which may in the future possibly be useful as a diagnostic test.

P. W. B-S.

EVANS (Alice C.). **The Serological Classification of** *Brucella melitensis* **from Human, Bovine, Caprine, Porcine, and Equine Sources.**—*Public Health Rep.* 1923. Aug. 24. Vol. 38. No. 34. pp. 1948–1963. With 1 chart. [22 refs.]

The author describes the agglutination and absorption reactions of 49 strains; one only was of caprine origin and 15 were human, but the English ones were old, 1907 & 1908.

1. These 49 strains could be differentiated into at least 7 serological groups, but 4, containing one or two strains each, were relatively unimportant.

2. The majority of the bovine and porcine strains fell into one large group (30 strains), Var. "abortus." Two small groups may be classed as sub-varieties of this (1 bovine and 2 human strains).

3. Another group includes 11 strains, human, bovine, equine and caprine, and is called Var. "Br. melitensis A."

4. A third group, of three strains, is characterized by the preponderance of coccoid cells. It is important that this was the variety that BRUCE was working with; it is called Var. "Br. melitensis B."

Simple agglutination tests cannot differentiate between abortus and melitensis A varieties, but these two can be differentiated from melitensis B variety by the simple agglutination test when the titre of the serum used is accurately known for the several varieties. We have thus 3 chief strains—(1) Abortus, almost entirely animal. (2) Melitensis A, of very mixed origin. (3) Melitensis B, the original *Micrococcus melitensis* of BRUCE, distinguishable from the others by simple agglutination tests.

It is important to note that besides the 49 strains originally tested 9 further strains, human and caprine, were received from BURNET, Tunis, These were not identical with any of the types already made, but were more closely related to the "Br. melitensis B" (that is to the original BRUCE type) than to the other serological groups and they appeared to be poor anti-body producers, agreeing in some factors with *M. paramelitensis.*

[*M. paramelitensis* was described by NÈGRE & RAYNAUD in 1912 as *M. paramelitensis* Br. No finality as to the specificity of the Abortus-melitensis organisms can be derived from this paper, but it rather favours the view that the human melitensis is a different organism as found in the original endemic areas, though the author definitely states that all the forms belong to one species.]

P. W. B-S.

EVANS (Alice C.). **The Nomenclature of the Melitensis-Abortus Group of Bacteriological Organisms.**—*Public Health Rep.* 1923. Aug. 24. Vol. 38. No. 34. pp. 1943–1948. [17 refs.]

In accordance with the rules of nomenclature of the Society of American Bacteriologists the author repeats that the abortus-melitensis group should be placed in a separate genus "*Brucella*" (Meyer & Shaw). There is, however, some doubt whether the latter genus should give way to the genus "Alkaligenes" of CASTELLANI and CHALMERS which would have priority if the difference between *A. foecalis* and abortus are insufficient for generic distinction ; in this case the genus would consist of *A. foecalis*, the Brucella group, and also probably include *B. bronchisepticus*. If the generic term "Brucella" is valid, the abbreviation Br. should be employed, and *Br. melitensis* would have priority over *Br. abortus-melitensis* as a specific name, but would include all varieties *Br. abortus, Br. Melitensis* A & B.

[The nomenclature of organisms will be greatly complicated if varieties are to receive separate names — *Brucella melitensis* var. *Abortus*, var. *Melitensis* A., var. *Melitensis* B.]

P. W. B-S.

DENGUE GROUP OF FEVERS.

MEGAW (J. W. D.). **The Dengue-Sand-Fly Fever Problem.**—*Indian Med. Gaz.* 1923. Sept. Vol. 58. No. 9. pp. 401–406. With 4 charts. [4 refs.]

The nomenclature of the short fevers found in the tropics is generally recognized as being very difficult, and the relation of one fever to another is uncertain. The confusion has been increased by the tendency to make new diseases and to give misleading names. Until the etiological agent of each has been discovered the separation of so many similar conditions by clinical characters is extremely unsatisfactory. The work of COUVY and WHITTINGHAM indicating a spirochaetal origin is therefore of great importance. The conception that dengue must have a short two-phase fever, with break bone pains and secondary rash, is misleading; in actual practice great variation of symptoms is seen in different epidemics and even in cases of the same, almost the only constant feature being the short duration. [The reviewer experienced three marked epidemics of dengue fever at Bombay in the Fleet when a great variety of types was seen.] For these the term "Dengue-like" has often been used. Outbreaks of sandfly fever may show some cases of the seven-day type, and in dengue epidemics there may be many cases with a short form like that of sandfly fever. LOUGHNAN in describing "The short fevers of Jamaica" notes that they can be divided into three types, one like the seven-day fever of Calcutta, a second like classical dengue, and a third like phlebotomus fever but without the presence of sandfly carriers. This overlapping of forms has also been noticed by the author at Calcutta and has induced him to recommend that all these forms of fever lasting not more than 8 days shall be called dengue if no definite cause can be demonstrated, with the addition of a special designation as "mosquito" or "sandfly" if these are proved to be the carriers. Japanese seven-day fever differs etiologically, being due to a leptospira, and infects mice; and it may be accompanied by jaundice.

The dengue and sandfly fevers described by COUVY from Asia Minor and by WHITTINGHAM in Malta are very important, but the author points out that in these the duration of the cycle is 11 to 12 days (viz. from onset of first pyrexia to the onset of the second) and that jaundice was noticed in one case. Immunity experiments have not so far given such conclusive results as would differentiate these fevers.

The author gives a table setting forth the characters of "the spirochaetal and related fevers"—Yellow fever, dengue group including mosquito-dengue, sandfly-dengue, and Couvy and Whittingham's dengue, the infectious jaundice group including Japanese seven-day fever and infectious jaundice, the relapsing fever group including louse-borne and tick-borne types, and finally rat-bite fevers. In this table the virus of mosquito and sandfly dengue is noted to be a filterable spirochaete [so far unproved]. This classification is put forward in the hope that it will help students "to form clearer ideas of the value and relationship of the members of the various groups," but the author acknowledges that further information may probably lead to considerable changes. Four typical charts are shown of the different fevers of the dengue group.

[The term Phlebotomus fever is now in general use and appears to be supported by abundant evidence and is unlikely to be displaced by that of sandfly-dengue. West Indian dengue as originally described shows few points of resemblance with the Phlebotomus fever described by BIRT. The unification of irregular types is, however, desirable. Th frequent substitution of the name LEDINGHAM for WHITTINGHAM is unfortunate, and might convey a suspicion of inaccuracy in other details.]

P. W. Bassett-Smith.

DE FARIA (Gomes). **Nota sobre a "*Leptospira couvyi*" n.sp. encontrada em um doente suspeito de dengue. (Nota prévia.)** [*L. couvyi* found in a Patient with Suspected Dengue.]—*Brazil Medico.* 1923. May 26. Year 37. Vol. 1. No. 21. pp. 287–288. With 2 text figs.

In a case of dengue in Brazil the author examined the blood about two hours after the fever commenced, and in one film found organisms having the appearance of leptospira. These were exceedingly delicate filaments with a tendency to hooking of the ends. They stained with difficulty, a fact borne out by the microphotograph which accompanies the paper and purports to illustrate the organism, which unfortunately it is impossible to detect. Another illustration, a drawing, shows clearly two organisms as tapering filaments with hooked ends. It is possible they represent leptospira, but as they were only seen in the single stained film it is difficult to have conviction on this point. The name *Leptospira couvyi* is given to the organism. Professor LUTZ, who examined the preparation, agrees with the author's diagnosis.

C. M. Wenyon.

BONNE (C.). **De dengueachtige ziekte van Suriname en gele koorts.** [The Dengue-like Disease of Surinam and Yellow Fever.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 3. pp. 469–473.

This endemic fever previously described by the author (see this *Bulletin*, Vol. 16, p. 424) does not occur and does not spread, notwithstanding occasional importation into inland estates, where Stegomyia is absent. Stegomyia is considered to be the probable carrier. If so. the epidemiology of this dengue-like fever shows a striking likeness to that of yellow fever. The possibility is discussed of this dengue-like fever being an abortive type of yellow fever, a disease not endemic in Surinam and against which the native population appears to be immune.

W. J. Bais.

CAMERON (R. D.). **Notes on Sandfly Fever.**—*Jl. Roy. Army Med. Corps.* 1923. Nov. Vol. 41. No. 5. pp. 369–371.

The guard of one N.C.O. and 3 men at Mejidieh Fort, Chanak, was changed every day and several men who performed this duty were attacked by sandfly fever. It was therefore possible to obtain definite information as to the incubation period. The total number of cases was 38, and 28 per cent. of the guard were affected; sometimes 3

out of the 4 were attacked. The incubation period was never less than 2 or more than 7 days. During the summer 500 cases were admitted to the F.A. hospital, Chanak. The men who lived in old buildings suffered most, those in tents 100 yards off almost equally, but a few were infected in the open camp as much as two miles away from any buildings.

Of the 500 cases, 71 were readmissions; 15 per cent. had two attacks and 7 per cent. three. Nine of the 21 men who were at Chanak in 1923-24 were affected both years.

P. W. B–S.

ARMSTRONG (C.) **Dengue Fever.**—*Public Health Rep.* 1923. Aug. 3. Vol. 38. No. 31. pp. 1750–1784. With 3 charts. [172 refs.]

The author has collected and reviewed the literature of dengue fever, and supplies a very full bibliography.

P. W. B-S.

ROCKY MOUNTAIN SPOTTED FEVER.

NOGUCHI (Hideyo). **Immunity Studies of Rocky Mountain Spotted Fever. II. Prophylactic Inoculation in Animals.**—*Jl. Experim. Med.* 1923. Nov. 1. Vol. 38. No. 5. pp. 605–626. [2 refs.]

The possibility of preventive inoculation for the disease was recognised by RICKETTS and GOMEZ (1908). As the causative organism cannot so far be cultured dependence has to be placed on the results of immunity experiments in animals.

The author has shown that (1) Freshly prepared mixtures of spotted fever virus and immune rabbit serum in neutral or superneutral proportions confer complete immunity on guineapigs (viz. slight excess of immune serum over amount of virus). (2) The immunizing power of the mixture is reduced considerably when heated to 60° C. for 20 minutes, but is still useful in reducing the severity of the disease. (3) Prolonged storage in ice box also reduces its power. (4) The virus alone, or mixed with normal rabbit serum, when allowed to die out or when killed by heat or chemicals does not induce immunity in guineapigs. For immunizing man the heated neutral mixture of the virus and a highly potent immune serum, preferably from a guineapig, may be used, two doses of 1 cc. given subcutaneously.

The ultimate object of the experiments Noguchi states is to produce a method in which the active (unheated) sero-vaccine may be safely applied to man.

P. W. Bassett-Smith.

BULLETIN OF THE MONTANA STATE BOARD OF HEALTH, 1923. June. *Special Bulletin No. 26.* 49 pp. With 1 map.—**Rocky Mountain Spotted Fever. Conference of Health Officials of the Rocky Mountain States and Provinces held at Missoula, Montana, April 5th and 6th, 1923.**

The conference was held at the instance of the State Board of Health of Montana, and this report embodies papers from the principal specialists on the subject of Rocky Mountain Spotted Fever, including Drs. WOLBACH, NOGUCHI and PARKER. The diagnosis, symptoms, prevalence, and incidence are separately treated, and methods of suppression are discussed together with studies of the virus and prophylactic serotherapy. The greater part of the report, which is very complete, has already been published by the several authors, and reviewed in this *Bulletin.* A resolution was passed expressing approval of the excellent work done by the Public Health Service and the Rockefeller Institute, and petitioning that it be continued.

P. W. B-S.

LABORATORY METHODS.

SCOTT (R. E.) & FRENCH (R. W.). **Uniform Nomenclature for Blood Counting.**—*Milit. Surgeon.* 1923. Oct. Vol. 53. No. 4. pp. 321–327. [4 refs.]

This is a very laudable effort to standardize leucocytic nomenclature and classification " in keeping with the more recent work in cytological pathology, embryology and physiology." The standard given will probably commend itself to most workers, and the types of leucocytes recognized under this standard may well serve to unify and render comparisons useful. Though " experience," as the author says, " has proved that, for intelligent and uniform results in differential blood counting, a great deal of eye training with a thorough knowledge of blood cell embryology is essential," yet the adoption of a recognized standard on sound lines and capable of improvement as knowledge advances would be all to the good.

The types of leucocytes recognized in this standard nomenclature, under normal conditions, are :—

Small mononuclears (lymphocytes),
Large mononuclears (endothelial leucocytes),
Polymorphonuclear neutrophiles,
Polymorphonuclear eosinophiles,
Polymorphonuclear basophiles,

to which are added, under pathological conditions, any of the following :—

Lymphoblasts (embryonic lymphocytes).*
Neutrophilic myelocytes (embryonic polymorphonuclear neutrophile).
Eosinophilic myelocytes (embryonic polymorphonuclear eosinophile).
Basophilic myelocytes (embryonic polymorphonuclear basophile).
Myeloblasts (embryonic myelocytes).
Normoblasts (embryonic erythrocytes).
Megaloblasts (embryonic normoblasts).

In the classification of blood-cells nuclear structure, the relation of nucleus to cytoplasm, the size and staining reactions of certain cytoplasmic granules may all be factors to be taken into consideration. Nuclear structure is of special importance in differentiating between lymphoblast and lymphocyte or between normoblast and megaloblast. The differential count is a percentage count and should be considered along with the total count in order to appreciate actual, as distinguished from relative, increases or decreases, and to arrive at the absolute values per cmm. for the several cells. This method of analysis

*Plasma cells, or the so-called Türck or irritation cell, may form either from lymphoblasts or lymphocytes under certain irritative conditions little understood from a pathological standpoint, and generally speaking have little significance when seen in the peripheral blood.

should be used in the study of all differential blood counts if the true pathological condition suggested is to be fully realized. Within normal and physiological conditions the total number of leucocytes per cmm. of the blood may vary between 4,000 and 12,000 and possibly as high as 15,000, and the differential count within the following limits :—

Polymorphonuclear neutrophiles	65 to 72 per cent.
Polymorphonuclear eosinophiles	1 to 2 per cent.
Polymorphonuclear basophiles	$\frac{1}{4}$ to $\frac{1}{2}$ per cent.
Small mononuclears.....	20 to 30 per cent.
Large mononuclears.....	4 to 10 per cent

[The reviewer thinks that the terms "small" and "large" used as above are open to objection, and suggests as an alternative form of classification the following :—

Polymorphonuclears	neutrophile eosinophile basophile
Mononuclears	lymphocytes endothelial leucocytes.]

The lymphocyte type of cell has its origin in the lymph tissues throughout the body, but more especially in the lymph nodes. It is not derived from the bone marrow.

The large mononuclear type is probably derived from endothelial cells lining blood, and to a less extent lymph, vessels by proliferation and desquamation. It is specially active as a phagocyte. The "so-called" transitional, considered to be a degenerating endothelial leucocyte, is included in this category and is not recognized as a separate class.

The polymorphonuclear types are probably derived from the bone marrow, passing successively through the stage of myeloblast and myelocyte to the differentiated and adult polymorphonuclear leucocyte with neutrophile, acidophilic and basophilic granules as the case may be. An increase of polymorphonuclear neutrophiles with an absence of eosinophiles indicates sepsis, while the presence of eosinophiles indicates either a chronic condition or resolution. The eosinophile is specially noticeable in intestinal tissue and its percentage in the blood is increased (both relatively and absolutely) in certain parasitic infections. An eosinophilia is also noted in certain acute tuberculous conditions and during recovery from any acute pyogenic infection.

The presence of any of the pathological forms of blood cells in the peripheral blood indicates an increased activity of the blood-forming organs, and the more embryonic the cells the more acute the process and the less favourable the prognosis.

Changes in Red Cells.—The types of degeneration recognized are :—

Polychromatophilia (change in staining reaction).

Basophilic stippling (change in staining reaction).

Achromia (loss of haemoglobin per cell).

Anisocytosis (variations in size).

Poikilocytosis (variations in shape).

All indicate a certain drain on the blood and may indicate a true disease of the blood-forming organs.

The presence of nucleated (embryonic) erythrocytes in the circulating blood has always a pathological significance, but in certain post-operative conditions may be a good sign. As indicated above, normoblasts and megaloblasts (the latter being the more embryonic) are the only types recognized in this standard classification.

J. D. Thomson.

SENEVET (G.). **L'emploi de la machine à écrire pour l'établissement des formules leucocytaires.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 622–624.

The typewriter is placed in a convenient position so that it can be operated by the fingers of one hand leaving the other hand free for the microscope. The instrument is set for 50 spaces to the line. A "blank" or "space" is chosen to represent a polymorphonuclear neutrophile, while each of the other categories of leucocytes is represented by a "letter"—letters close together being chosen for those recurring most frequently so as to be within easy control. A sheet of paper is placed in position and the count is begun. At the end of each line of 50 spaces the machine is automatically arrested, and is then set for the next line. When the desired number of leucocytes has been counted (400 or 500 = 8 or 10 lines), the sheet of paper is removed and the letters representing each category counted. The difference between the sum of all the letters and the total leucocytes counted gives the number of polymorphonuclear neutrophiles.

If desired to do an Arneth's count, in place of a "blank" for each polymorphonuclear neutrophile a figure, 2, 3, 4 etc., is used to represent each, according as its nucleus has 2, 3, 4 etc. divisions.

With a little practice the method is rapid, easy and accurate. It can be interrupted at any stage and resumed again. The record can be preserved, the counting done at convenience and kept for future reference. For those who possess a typewriting machine the method is to be recommended.

J. D. T.

FAIRLEY (K. Douglas). **The Leucocytes in Health and in Disease.**—*Med. Jl. Australia.* 1923. June 16. 10th Year. Vol. 1. No. 24. pp. 655–676. With 1 fig. [55 refs.]

This important paper should be read *in extenso.* The author takes, first, the leucocytes of normal blood. Showing from his own observations that the total leucocyte count in normal adults may vary between 4,500 and 15,000 per cubic millimetre, he argues that too much importance must not be attached merely to a fairly high leucocyte count, and emphasizes the proposition that it is not so much the total, or the particular percentage, of the various cells present, but the detection of certain pathological forms that constitutes the value of blood examinations; and he also lays stress on the impossibility of making a diagnosis, in a difficult case, upon a single examination. The argument is illustrated by a table showing the percentage and absolute numbers of leucocyte counts in 29 apparently normal young doctors (15 female and 14 male) at the Melbourne Hospital—a table rather too long to reproduce. We may, however, introduce the summary of the 36 observations on these 29 young adults to justify the author's contention that the accepted formulae for normal leucocyte-proportions need revision.

TABLE II.—THE AVERAGE, MINIMUM AND MAXIMUM LEUCOCYTE COUNTS IN TWENTY-NINE NORMAL ADULTS.

Leucocytes.	20 Counts on 15 Females.			16 Counts on 14 Males.			36 Counts on 29 People.
	Absolute numbers per cmm.			Absolute numbers per cmm.			Absolute Nos. per cmm. and Percentage.
	Ave.	Min.	Max.	Ave.	Min.	Max.	Average.
Polymorpho. Neutroph.	5,400	3,700	8,800	4,250	2,525	6,420	4,825 (54·4%)
Polymorpho. Eosinoph.	150	20	315	120	35	400	130 (1·5%)
Polymorpho. Basoph.	35	—	100	35	15	80	35 (0·4%)
Lympho., Large and Small	3,380	1,650	6,050	3,520	2,450	6,350	3,460 (39·1%)
Large Mono. and Transit... ...	400	125	725	400	200	750	400 (4·5%)

The author next deals with the leucocyte response to disease, which he considers under two conditions, namely (1) where there are no pathological immature leucocytes circulating in the blood, and (2) where, as in the leukaemias, these immature elements are present. (1) In the first class of cases the leucocyte response varies with the type of tissue infected, the infecting organism, and the course of the disease: generally though by no means always there is a neutrophile polymorphonuclear response to coccal infections, an eosinophile response to helminth infections, a lymphocyte response to bacillar infections, and a reaction of the endothelial leucocytes to protozoa (*e.g.* malaria). (2) Going on to the leukaemias the author presents a careful study based on 41 cases—11 acute, 25 chronic myeloid, and 5 chronic lymphatic—treated in the last thirteen years in the Melbourne Hospital, the study embracing blood phenomena, differential diagnosis, and pathology. The relations of lymphosarcoma, leucosarcoma, Hodgkin's disease, and chloroma are discussed, and then aetiology and treatment. The following are the author's main general conclusions :—

"1. McJunkin and Charlton's special stain for endothelial cells is very useful in distinguishing between the large lymphocytes and the large mononuclear cells of the blood.

. . . . . .

"4. In the diagnosis of acute leuchaemia care should be exercised to exclude acute infective lymphoblastosis, as the prognosis in the two conditions is quite different.

"5. Lympho-sarcoma, leuco-sarcoma and lymphatic leuchaemia are probably merely different manifestations of the same disease, and are better grouped under the term lymph-adenosis, leuchaemic and aleuchaemic.

"6. The term Hodgkin's disease should be limited to those cases which show the typical histological changes which enable a definite diagnosis and prognosis to be made. It is probably aetiologically entirely distinct from lymph-adenosis.

"7. Pappenheim's conception of the rôle of the reticulo-endothelial system enables these different conditions to be appropriately considered as variations of a single pathological process.

"8. These allied conditions are probably the result of the action of toxic agents widely diffused throughout the body. Such toxic agents are probably derived from living organisms.

"9. The investigation of the leucocytic response in leuchaemia following the intravenous injection of foreign protein may lead to further information with regard to the differentiation of the immature white blood corpuscles and of the functions of the leucocytes.

"10. The loss of power of production of antibody is certainly not invariable in leuchaemia."

A. Alcock.

McJunkin (F. A.) & Charlton (Alice). **The Practical Identification of Endothelial Leukocytes in Differential Blood Counting. Fourth Report of Studies on the Mononuclear Cells of the Blood.**—*Arch. Intern. Med.* 1918. Aug. 15. Vol. 22. No. 2. pp. 157–159. With 1 plate. [3 refs.]

In an article entitled "A Simple Technic for the Demonstration of a Phagocytic Mononuclear Cell in Peripheral Blood" published in *Archives of Internal Medicine*, 1918, Vol. 21. No. 1, pp. 59–65, McJunkin described a method by which it was shown that the large mononuclear cells of the blood, usually differentiated by their morphological characters and staining reactions, take up lamp black and can be recognized with certainty by the presence of the carbon particles massed within their cytoplasm. In morphology and in phagocytic properties these large mononuclear cells of the blood correspond to the endothelial leucocytes of the tissues and are probably of endothelial origin. The technique on which the results and conclusions were based was fully described, but even slight variations of that technique usually yielded negative results and the author was unable to recommend it as a routine method for the identification of this class of leucocyte in differential blood counts.

The present article is concerned with a staining reaction which brings out characteristic cytoplasmic granules in the endothelial leucocytes. "The granules stain blue in a solution of alphanaphthol-methyl-violet." Details connected with the preparation of the stain, the technique employed, and the reaction of blood cells to the stain are given. Blue staining granules also occur in polymorphonuclear neutrophiles and eosinophiles, but not in lymphocytes. "The differential character of the endothelial leukocyte is the presence of blue granules in a mononuclear cell." The conclusions drawn are, "The endothelial leukocytes of the peripheral blood can be stained differentially. That the stain is specific is shown by staining blood in which this variety of leukocyte is characterized by ingested carbon."

[The method here described has certain practical disadvantages especially connected with the preparation of the stain. It may be useful in exceptional cases and as an occasional check, but in everyday routine differential counts reliance will still be placed on experienced recognition of the morphological characters and the staining reactions by which these large mononuclear leucocytes (the recognized phagocytic properties of which McJunkin demonstrated by the lamp-black method referred to above) have usually been differentiated.]

J. D. T.

BARLOW (D. L.). **A Simplified Method of preparing a Modified Romanowsky Blood Stain.**—*Med. Jl. Australia.* 1923. July 28. 10th Year. Vol. 2. No. 4. p. 90. [1 ref.]

TERRY (B. T.), in the *Journal of Laboratory and Clinical Medicine,* 1922, Vol. 8, No. 3, describes a new process for the rapid preparation of polychrome methylene blue, the technique of which is as follows :—

A solution of 1 per cent. pure methylene blue and of 0·5 per cent. anhydrous sodium carbonate in distilled water is brought to boiling point in a porcelain dish and kept gently boiling for two and a half minutes. It is then cooled and 500 cc. of a 0·1 per cent. solution of yellowish water-soluble eosin are slowly added. A precipitate forms and is separated off by filtration and dried.

The author of the present article uses a half-saturated solution of the dried precipitate prepared as above in pure methyl alcohol (free from acidity and acetone) for staining blood films. The pure stain is allowed to act on fresh unfixed films for one and a half minutes. It is then diluted with 2 volumes of distilled water and allowed to act for three minutes longer. The films are finally washed with distilled water.

The purity of the methyl alcohol is of great importance, as the polychrome stain loses all its best qualities if dissolved in an alcohol containing the least trace of impurity. The distilled water should be neutral.

The chief advantages claimed for this stain are its ease of production and its richness in polychrome qualities.

J. D. T.

IOFF (I.). **Beschleunigte Färbung des Dicktropfenpräparats.** [Rapid Staining of Thick Drop Preparations.]—*Rev. Microbiol. et Epidemiol.* Saratov. 1923. Vol. 2. No. 1–2. In Russian pp. 68–69. Abridged Version in German p. 95. [1 ref.]

The author, according to the abridged version, used the following stain :—1 per cent. methylene blue 4 parts, 1 per cent. fuchsin 1 part, 1 per cent. acetic acid 4 parts, distilled water 40 parts. In this the films are dehaemoglobinized and stained in from 5 to 15 minutes according to the thickness of the preparation. They are then thoroughly rinsed, dried, and examined with an oil immersion lens. An ideal stain, the author says, is still to be found for thick drop preparations.

[Dry, unfixed, thick-drop preparations of blood may be dehaemoglobinized and stained simultaneously if placed vertically in a suitable vessel containing any appropriate aqueous stain.]

J. D. T.

MOSCHKOWSKI (Sch.). **Eine einfache Methode zur Schnellfärbung von Blut und Blutparasiten.** [A Simple Method for the Rapid Staining of Blood and Blood Parasites.]—*Cent. f. Bakt.* 1 Abt. Orig. 1923. May 4. Vol. 90. No. 4. pp. 296–299. [9 refs.]

This quick staining method is recommended by the author more especially for "mass examination" of blood and organ smears, being suitable for blood morphology and for staining malarial parasites, trypanosomes and leishmania.

Solutions required. 1. A borax methylene blue solution, similar to MANSON's but about half the strength, may be prepared by rubbing up in a mortar 1 gramme of methylene blue and 2 grammes of borax and dissolving the mixed powder in 100 cc. of hot water (about 90° C.) ; or the

borax may first be dissolved in the boiling water over a flame and the methylene blue added after removal from the flame. In either case the solution after cooling is filtered. For use it must be diluted 3 to 5 times with water.

2. A saturated watery solution of tannin may be prepared, filtered, and kept in a stoppered flask with a small pieece of camphor or of thymol added as a preservative. For use this solution has to be diluted 8 to 12 times with water, making a dilution of about 2 to 5 per cent. of tannin.

Staining. The preparations to be stained should be fixed for a somewhat shorter time than is usual, not longer than from 5 to 10 minutes, in 96 per cent. ethyl alcohol, or from 1 to 2 minutes in methyl alcohol.

It is convenient to have two vessels (one for the diluted stain and the other for the diluted tannin solution) of such a size that one can readily immerse and withdraw from them a slide (or two slides placed back to back) near each other, and close to a tap or large vessel containing tap water.

The preparation (fixed as above) is now immersed in the diluted stain for 2 to 5 seconds, removed, carefully rinsed in tap water, and then immersed in the dilute tannin solution for 1 to 3 seconds, after which it is again rinsed in tap water and allowed to dry. The whole procedure (exclusive of drying) lasts about 10 seconds.

The tannin solution must be replaced when it becomes green. The diluted staining solution retains its staining properties for months.

It is not necessary to be painfully particular about the dilutions, Alterations in concentration and variations in time (within the limits given) lead to variations in tint or tone.

The coloured preparation somewhat resembles a Giemsa preparation. Erythocytes stain rose to reddish violet—polychromatophilia being easily recognized. The nuclei of leucocytes stain red, neutrophile granules faint reddish, while eosinophile granules remain unstained. Eosinophiles are recognized by their protoplasm being filled with clear unstained granules. The cytoplasm of lymphocytes stains blue, that of "monocytes" [endothelial leucocytes] grey blue. Platelet granules stain faint reddish.

The cytoplasm of malarial parasites stains blue. The pigment is clearly defined. Schüffner's dots stain faint reddish. The nuclei of the ring-forms and of the younger schizonts stain deep red, those of the older parasites appear much fainter, while those of the gametocytes are hardly visible.

In smears of oriental sore the leishmania stand out sharply. The cytoplasm stains bluish, the nuclei red to reddish violet.

The cytoplasm of trypanosomes stains blue with metachromatic inclosures, while the nucleus, kinetonucleus, and flagellum are faintly stained.

A long excursion by doubtful and devious paths into the uncertain nature of the reactions is next undertaken by the author, but it is not necessary for us to accompany him.

J. D. T.

French (R. W.). **Acetic-Alcohol Fixation for Parasitic Amoebae and for Tissues.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. May. Vol. 3. No. 3. pp. 213–223. With 3 plates.

Carnoy's fixative, consisting of absolute alcohol 6 parts, chloroform 3 parts, and glacial acetic acid 1 part, is here recommended as excellent for almost any of the staining methods, but especially useful when followed by haematoxylin. It is used cold and ensures quick killing, rapid fixation, and fidelity of tissue elements when followed by haematoxylin stains.

Smears on cover-glasses or on slides, as soon as made and before they can dry, are immersed in the freshly prepared fixative for 10 to 15 minutes—

10 being ample for complete fixation of average smears. Over-fixing is to be avoided. When removed from the fixative they are washed in one change of absolute alcohol and then immersed in fresh absolute for 10 to 20 minutes and afterwards in 95 per cent. alcohol for 10 to 20 minutes, followed by distilled water for 10 to 20 minutes longer, before being stained.

For tissue fixation (1) Immerse small pieces of the tissue in freshly prepared fixative for 1 to 2 hours. (2) Wash in absolute alcohol (one change). (3) Immerse in absolute alcohol for 1 to 3 hours. (4) Blot off the alcohol and immerse in chloroform for 1 hour, and in fresh chloroform for another hour and a half. (5) Transfer to chloroform and paraffin for 2 hours to overnight. (6) Paraffin alone for 1 to 2 hours. (7) Embed. In this way good paraffin sections, well-fixed and well-stained, can be obtained in from 8 to 10 hours.

J. D. T.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE. 1923. Mar. 15 & May 17. Vol. 17. Nos. 1 & 2. pp. 1–2.—**Laboratory Meeting.**

Dr. A. C. STEVENSON showed sections from leprosy tissue stained by Fontes' method.

"This method is as follows :—(1) Stain with warm carbol fuchsin and decolourise, as in Ziehl Neelsen. (2) Wash well in water to get rid of acid. (3) Stain by Gram's method, and counter-stain with Biswarde [Bismark] brown or orange G. Sections or films as stained show well the acid fast and the varying degrees of non-acid fastness of the leprosy bacilli, and bring out the same variations in the granules in the bacilli themselves. The sections also illustrate the varying acid fastness of the leprosy bacilli in different cases.

"A section stained in the same manner, demonstrating tubercle bacilli in a guinea-pig inoculated from a pure culture, was also shown for comparison."

J. D. T.

YAKIMOFF (W. L.). **Note sur la technique bactériologique. Procédé d'Orticoni.**—*Bull. Soc. Path. Exot.* 1923. Apr. 11. Vol. 16. No. 4. p. 226.

As a quick means of diagnosing typhoid and paratyphoid M. ORTICONI (1915) recommended the addition of glucose as well as of bile to the nutrient medium for the blood culture. To 1,000 cc. of ordinary bouillon he added 2·5 gm. of glucose and sterilized for half an hour at 105° C. To 100 cc. of this glucose bouillon he added 2 to 3 cc. of filtered and sterilized ox bile just before introducing 10 to 15 cc. of the patient's blood obtained aseptically.

The bacilli of both typhoid and paratyphoid grow in the presence of bile, but while those of the latter ferment glucose, those of the former do not. The author of this communication says that he has found ORTICONI's recommendation very useful in reducing considerably the time required for diagnosis. While the culture with bile alone requires at least 18 hours and the further differentiation of typhoid from paratyphoid other 12 to 18 hours, he finds that the whole examination by the combined method is reduced to about 12 hours and that further differentiation is superfluous.

J. D. T.

ENLOWS (Ella M. A.). **A Sugar-Free Medium for Fermentation Studies.**—*Public Health Rep.* 1923. Sept. 14. Vol. 38. No. 37. pp. 2129–2132. [2 refs.]

Having found that beef and horse meat infusion broths vary greatly in their carbohydrate content, the author of the present article, after testing varying combinations, recommends the following formula to produce a sugar-free medium adapted for fermentation studies and varying from pH 7·2 to pH 7·4 (the hydrogen ion concentration near which a great number of the pathogenic and allied organisms grow best).

Tap (or distilled) water	1,800·0	cc.
Peptone	10·0	grams.
Na_2HPO_4	14·5	,,
KH_2PO_4	1·4	,,
Agar	2·0	,,

To this the fermentable substance and the indicator are added. The indicator used in the first instance is prepared as follows :—

Brom thymol blue	0·1	gram.
N/20 NaOH	3·2	cc.

Grind in agate mortar. When solution is complete, add 3 cc. of distilled water. 3 drops of this "in each 500 cc. make a medium with very positive color change due to increased hydrogen ion concentration." Lest attack upon the peptone should be considered as obscuring the results of the carbohydrate attack, the medium with indicator but without the addition of fermentable substance is used as "non-fermentable controls."

Two lists are given, one of organisms that have been grown on this medium with characteristic results and the other of fermentable substances tested. The article ends with the following summary :—

"A medium has been devised containing a sugar-free base, to which fermentable substances and the indicator brom thymol blue may be added, which serves for fermentation studies on a large number of bacterial species. The medium is based upon the low-percentage agar medium of Hitchens, substituting a synthetic, sugar-free base for the beef broth used by him.

"The medium is easily prepared, and very economical, making its use advantageous for testing the purity of large numbers of stock cultures or for classroom demonstration. Actual growth of the organisms under test is readily observed because of the clarity of the medium ; and the medium will support the growth of a large number of micro-organisms either with or without the addition of carbohydrate or other fermentable substance. Anaerobes as well as aerobes may be studied in this medium. Variations of the salt content might prove advantageous in case of certain species."

J. D. T.

SOPARKAR (M. B.). **The Nutritional Values of Heated Blood Agar.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 421–428. [8 refs.]

The object of the investigation, details of which are given in this article, was "to determine the effect of varying degrees of temperature upon the nutritive qualities of blood when added to a plain medium for the cultivation of the haemophilic organisms."

The conclusions arrived at are :—

"Under the conditions of experimentation it may be concluded that :—

"1. Unheated blood affords a poorer growth of *B. influenzae* than heated blood.

"2. The growth-promoting quality of heated blood is gradually developed as the temperature used in heating rises.

"3. The maximum development of this growth-promoting quality in the case of *B. influenzae* takes place for a temperature of 67° to 70° C. applied for 10 to 15 minutes.

"4. Heating the blood used in the medium at temperatures beyond the optimum leads to a gradual destruction of this quality.

"5. The luxuriance of growth of *B. influenzae* upon heated blood media depends, within certain limlts, upon the concentration of blood in the medium."

J. D. T.

i. NAND LAL. **The Re-Use of Media. Part II.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 441–443. [6 refs.]

ii. —— **The Effect of Direct Sunlight on Sealed Cultures of Organisms.** —*Ibid.* pp. 445–447. [1 ref.]

i. The trials were confined to the use of trypsin and a 4 per cent. peptone solution. The results are tabulated and the conclusion arrived at is that "the addition of trypsin to a used medium restores to a large extent its nutrient character." In the discussion which precedes the conclusion it is suggested that the trypsin here acts more as a pancreatic extract supplying growth-promoting accessory substances than as a ferment.

ii. Conclusions. "Under the conditions of test here set out I may conclude that :—

"1. Exposure to direct sunlight is lethal to organisms contained in sealed tubes, but this may be due to the sterilising effect of the heat rays.

"2. Systematic alteration of temperature between 37° C. and room temperature was not more lethal for the test organisms than preservation in the dark at room temperature, with the exception of the Cholera Vibrio.

"3. The Cholera Vibrio showed itself much more susceptible to the conditions imposed than the other organisms used."

J. D. T.

VARDON (A. C.). **Desiccated Nutrient Media.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 429–432. [1 ref.]

HARVEY (W. F.) in a paper entitled "Large Scale Production of Vaccine" [see this *Bulletin*, Vol. 20, p. 593] refers to casein which can be stored in the form of coarse powder for the preparation of peptone media, and to an agar powder which can be stored without deterioration and when required has merely to be weighed out and added to nutrient bouillon to make a solid medium.

The object of the experiments carried out by the author of the present article was to show that :—

"(1) Simple nutrient medium could be reduced to a dried condition without altering its nutritive value. (2) Various ingredients, such as sugar, serum, inhibitory dyes, etc., could be incorporated with simple nutrient medium to give special media, and dried without altering their special properties. (3) Economic production on a large scale was possible. (4) The dried medium could be made ready for use with a minimum of time and trouble."

Though a number of media were experimented with the author confines his detailed descriptions "to the preparation and reproduction

of simple nutrient agar, simple bouillon, and as examples of special media to the preparation of Loeffler's and Aronson's media."

J. D. T.

BERNARD (P. Noël). **Sur un mode de préparation du vaccin anti-staphylococcique.**—*Bull. Soc. Path. Exot.* 1923. June 13. Vol. 16. No. 6. pp. 390–392. [1 ref.]

After referring to the frequency, severity, and debilitating effects of furunculosis in tropical climates, the author describes the preparation of a stock vaccine which he recommends for the treatment of this malady.

A goodsized unbroken boil, with well-marked peripheral reaction, is chosen, and the skin over it is disinfected with tincture of iodine. A drop of pus is drawn by means of a pipette and is transferred from the boil to the water of condensation in an agar tube. A little of the dilution is then transferred on the point of a platinum wire to the water of condensation in a second tube. The two tubes are now inclined so as to spread the water of condensation over the surfaces of the agar. From the second tube 4 to 7 well-isolated colonies should be obtained, each of which after 24 hours' incubation at 37° C. may attain to a diameter of 5 mm. These colonies are verified and the water of condensation of a Roux bottle of agar is inoculated from one of them. After 20 hours' incubation an abundant growth is obtained. 50 cc. of normal saline are added and the growth is removed from the surface of the agar and mixed with the saline. The mixture is then centrifuged, washed 3 times by centrifugation and the final deposit diluted with 50 cc. of pure glycerine (30° Baume), sterilized and placed on ice or in cold chamber at about 4° C. All the germs in the dilution are dead in the course of 1 to 3 months. The vaccine is prepared from the mixed contents of 8 flagons containing the dead cultures of 8 different strains of staphylococci (or of staphylococci derived from 8 different sources). 600 cc. of normal saline are added to each 50 cc. of pure glycerine containing the washed growth of one Roux bottle. The dilution thus obtained contains about 6,000 millions of staphylococci to the cc. Lastly the vaccine is put up in ampoules for use.

The vaccine is given daily, ½ to 1 cc. on the first day, 1 cc. on the second and on following days. For adults the dose may be raised to 2 or 3 cc. per day, and for infants it is diminished in proportion to age. The contraindications are the same as for other bacterial vaccines.

As the result of treatment usually in about 12 hours after the 2nd injection (*i.e.* about 36 hours after the commencement of treatment) a distinct amelioration has set in. The painful tension abates. In 2 or 3 days later the boils that were forming are drying up, while those fully formed, if they do not recede, quickly ripen and discharge their contents. The treatment is continued for 6 days at least, and in exceptional cases much longer. Any boils that have reached the stage of suppuration should be evacuated at the beginning of the treatment.

From observation of many hundreds of cases the author is convinced that the value of autovaccines depends less on the strains used having been derived from the case treated, than on the mode of preparation and on the directness of the transfer. A vaccine prepared from staphylococci that have been grown only once on an artificial medium and killed by glycerine as described above is more active than one where the staphylococci have been killed by heat at 68° to 72° C., or than one killed by glycerine but from staphylococci that have been sub-cultured several times on artificial media, or after undergoing a passage through a rabbit.

J. D. T.

i. HARVEY (W. F.) & IYENGAR (K. R. K.). **The Development of Protection after Prophylactic Inoculation.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 990–995. [9 refs.].

ii. —— & —— **The Duration of Protection after Prophylactic Inoculation.**—*Ibid.* pp. 1147–1149. [1 ref.]

iii. —— & —— **The Influence of Age and Temperature on Bacterial Vaccines. Part III.**—*Ibid.* July. Vol. 11. No. 1. pp. 110–112. [1 ref.].

iv. —— & —— **On the Relation between Size of Prophylactic Dose and Protection.**—*Ibid.* pp. 113–118. [11 refs.]

v. —— & —— **On Immunization with relatively Avirulent Living Organisms.**—*Ibid.* Oct. Vol 11. No. 2. pp. 433–436. [5 refs.]

vi. —— & —— **Immunization by Re-Inoculation, after a Long Interval, with a Diminished Dose of Vaccine.**—*Ibid.* pp. 437-440. [3 refs.]

i. As in most of their work on immunity problems the organism employed was *B. avisepticus*, the experimental animal the pigeon, the inoculations (both prophylactic and test) were intravenous, and the doses used are given in weights of the dry organism as determined by Brown's opacity tubes. A table is given showing the results of testing 220 pigeons. These results are discussed, and the particular conclusions arrived at are that :—

"1. No evidence of protection is manifest 7 days after with a single dose of prophylactic antigen.

"2. Development of immunity is significantly manifest very quickly after the administration of a second dose of prophylactic antigen.

"3. Development of immunity reaches its maximum about the 14th day after the administration of a second dose of prophylactic antigen and remains at its maximum up to at least the 30th day.

"4. The curves showing rise, maximum, maintenance and fall must be of very different type for agglutinin production and immunity production."

ii. In their experiments to determine the duration of protection the conditions of testing were identical with those for development, but were carried on to the point of time at which degree of immunity falls to zero or nearly zero. The results of testing 80 pigeons are given in tabular form. Their particular conclusions are that :—

"(1) Evidence of a high degree of protection is manifest for 3 months after inoculation of antigen.

"(2) Evidence of almost complete loss of protection is manifest 5 months after inoculation of antigen."

iii. In Part II of this series [see this *Bulletin*, Vol. 19, p. 781] the authors concluded that "a fowl cholera vaccine does not deteriorate in antigenic potency with age or with subjection to the action of any temperature to which it is likely to be exposed within 6 or 9 months from date of preparation." The present investigation (Part III) was carried out to ascertain if the same holds with alterations of temperature. From their experiments which were carried out on the same general lines as before the authors conclude that :—

"1. A 'fowl cholera' vaccine does not deteriorate in antigenic potency when subjected, 24 hours at a time for a month, to the varying temperatures of 37° C. and about 18° C.

"2. It may be opined that 'fowl cholera' vaccine will not deteriorate in antigenic potency with age or with subjection to the action of varying temperatures to which it is likely to be exposed within the period when it may be expected to be used.

"3. What applies to 'fowl cholera' vaccine may apply to some other vaccines also."

iv. The organisms used and the methods employed being the same as in other investigations belonging to this series the authors conclude as a result of their investigation that :—

"1. A dose of prophylactic vaccine composed of dead organisms may prove undesirably toxic, as demonstrated by the occurrence of deaths among trial animals during the course of immunization.

"2. It is very desirable to determine as exactly as may be what is the optimum size of dose to produce maximum protection.

"3. According to the size of prophylactic dose there is produced an insufficient or a sufficient protection and the insufficient protection is exhibited with both too small and too large a prophylactic dosage.

"4. It is undesirable to overstep in either a minus or a plus sense the limits of prophylactic vaccine dosage capable of producing maximum protection.

"5. The rise of agglutinin content of the serum as a result of administration of prophylactic antigen does not correspond with the rise and fall of protection.

"6. What applies to fowl cholera vaccine may apply to some other vaccines also."

v. "With such an organism as has been used by us and with the methods employed we may conclude that :—

"1. No difference of effect exists as between a prophylactic vaccine of living, relatively avirulent organisms and a vaccine of dead virulent organisms.

"2. Agglutination titre does not correspond to protection.

"3. What applies to fowl cholera vaccine may apply to some other vaccines also."

vi. "With such an organism as has been used by us, and with the methods employed we may conclude that :—

"1. Complete immunization of animals can be effected with doses of antigen very much smaller than the lowest optimum prophylactic dose originally administered, and that, after they have apparently lost the immunity originally conferred.

"2. What applies to fowl cholera vaccine administered intravenously, may apply to other vaccines also and to their subcutaneous inoculation."

J. D. T.

WESTERN (G. T.) & BARNARD (J. E.). [Revised by.] **Methods for the Detection of** *Spironema pallidum.—Med. Res. Council. Privy Council. Special Report Series No.* 19 (Revised). pp. 27–48. With 3 plates & 11 figs. [2 refs.]

The importance of detecting the Spironema at the earliest stage of the primary infection cannot be overestimated. The present report embraces :—

I. *Collection of Material.*—Under this heading directions are given for collecting material from (*a*) superficial lesions, (*b*) lesions of the mouth, (*c*) skin lesions, and (*d*) lymph glands. In each case the object aimed at is to obtain fluid freshly expressed from the tissues of the lesion, free from contamination and from admixture of blood.

II. *Demonstration of the spirochaetes.*—1. Dark-ground Illumination.—This, the ideal method for demonstrating *S. pallidum,* is dealt with by J. E. Barnard in a comprehensive manner under the headings "The Microscope," "Objectives," "Oculars," "Cover-glasses and Slides," "The Dark-Ground Illuminator,' "Illuminants." "Manipulation" and "Method employed for differentiating between *S. pallidum*

and other Spironemata." Three plates illustrate spirochaetes demonstrated by dark ground illumination and show the main points by which *S. pallidum* can be distinguished from other spirochaetes. The relation which the number of spirals bears to a given length is a useful aid to diagnosis. *S. pallidum* should have seven complete coils to the width of a normal red blood corpuscle (*i.e.* to 7·5 μ). To facilitate comparison an eye-piece scale has been devised which in effect introduces a number of artificial corpuscles into the field of view. The apparatus, which is described and illustrated, can be obtained from Messrs. Hawksley & Sons.

2. Stained Films.—In this section Clifford DOBELL referring to the staining properties of *S. pallidum* writes, "The difficulty of staining this organism is so characteristic of it that it may be laid down as a general rule that when spirochaetes are visible in preparations stained by such methods [*i.e.* by the simple aniline dyes commonly employed in bacteriology] then they certainly do not belong to this species."

"Giemsa" is specially recommended as being the most serviceable of the modifications of Romanowsky ("by far the simplest and most convenient stain for demonstrating *S. pallidum* in smears") and useful practical instructions for its employment are given of which the following is a résumé :—

Strict attention must be paid to every detail in the process ; slides used in the making of the films must be specially cleaned ; the films must be spread thinly and evenly (if necessary the material to be examined may be diluted to a suitable consistency with physiological saline solution) ; allow the films to dry in air, or still better place them in a desiccator (never employ heat, and avoid dust particles) ; when dry immerse the films for 5 to 10 minutes in absolute alcohol (pure ethyl or methyl alcohol) and transfer them to distilled water before applying the stain ; use neutral distilled water with which to mix the staining solution. The following simple way *to adjust the distilled water to the right reaction* is copied verbatim. "Measure the amount of water required (say 5 c.cm. for staining two or three films) into a clean test-tube. With a glass rod add a very small drop of neutral red solution (1 per cent. in distilled water), and stir. The water will turn pink (acid). Now add, with the glass rod, a trace (not a drop) of 1 per cent. aqueous sodium carbonate solution, and stir again. If the solution turns a pinkish yellow it is now neutral ; if it remains pink it is still acid, and a further trace of carbonate must be added, and the process repeated till the right colour is obtained ; if it turns yellow, it has become alkaline, and too much carbonate has been added. (In this last case it is best to discard it, and begin again.) The colour to be aimed at is one between red and yellow, and with a little practice it can usually be hit off in a few seconds. When the water shows the right reaction, as thus determined by its colour, it is ready for use. *Add the stain to this water*—containing the neutral red—dropping in one drop of stain for every cubic centimetre of water in the test-tube. (The small amount of neutral red in no way interferes with the working of the stain.) Do not add *more* than this amount of stain to the water—in the erroneous belief that a stronger solution will be a more potent stain. Mix the solution by *stirring* carefully with the glass rod. *Never shake* the solution, nor squirt it in and out of a fine pipette, as this precipitates the stain and may ruin the solution completely. The solution is now ready for use, and in this dilute state will not keep. It must be used *at once*."

Cover the whole surface of the slide with the diluted stain, pouring it from the test-tube on to the films and using an excess of solution for each film ; stain for 3 to 6 hours ; always *flush* the stain off the slide with a strong jet of water ; wash for a few minutes longer, then rinse in distilled water and allow to dry (or after wiping the back and edges of the slide dry place it in a desiccator until quite dry),

The Indian Ink and Congo Red methods, though very useful for demonstrating other Spirochaetes, are not recommended for the detection of *S. pallidum.* The Silver Nitrate methods are also described [see also this *Bulletin*, Vol. 20, p. 591].

Advantages and Disadvantages of Staining Methods for demonstrating *S. pallidum.*—Where the results are positive, well-stained preparations afford characteristic appearances and cannot be questioned. On the other hand, *S. pallidum* has a notable lack of affinity for most staining reagents, and an erroneous idea of their frequency and numbers may be formed as many may remain unstained. So also distortion caused by drying and absence of characteristic movement are distinct disadvantages.

III. *Soft Chancre and Balanitis.*—Referring to soft chancre and balanitis the authors conclude that there is not sufficient evidence of their being specific diseases due to a single species of micro-organism, but that the diagnosis, which should be founded on clinical evidence, should not be given until syphilis has been excluded by observations extending over a period of 12 weeks.

Appendix II. On the Nomenclature of the Spirochaete of Syphilis. By Clifford DOBELL.

The author by a critical examination of the subject in strict accordance with the laws of nomenclature makes it clear that the correct name of the Spirochaete of syphilis is in full *Spironema pallidum* (SCHAUDINN, 1905), VUILLEMIN, 1905 ; or more briefly *Spironema pallidum* Schaudinn.

J. D. T.

WESTERN (G. T.). [Revised by.] **The Laboratory Diagnosis of Gonococcal Infection.**—*Med. Res. Council. Privy Council. Special Report Series No.* 19 (Revised). pp. 5-26. With 2 plates. [22 refs.]

In the introductory paragraphs attention is called to the difficulties associated with the diagnosis of gonococcal infection ; and the adoption of some routine bacteriological technique whereby the chances of incorrect diagnosis may be reduced to a minimum is recommended. It is pointed out that, though a *positive* diagnosis is justified from expert microscopic examination of the films prepared and stained by the proper technique, a *negative* diagnosis requires that the negative findings of such an examination be confirmed by cultural and other methods. Systemic infection may have occurred, and may persist long after the gonococci have apparently been eliminated from the primary focus or foci of infection, and for this order of cases indirect methods of investigation such as complement fixation may be required before a negative diagnosis may be given.

The subject is then treated under five separate headings.

I. *The localities to be examined for the presence of Gonococci.*

Only chronic cases and those in which there is little or no secretion present difficulty in this connexion. The sites where gonococci may persist for long periods and the routine procedure in the examination both of the male and of the female suspect are given ; and it is pointed out that the procedure, however thorough, is of absolute diagnostic value only when a positive result is obtained, although repeated and consistently negative results by experienced workers are not without value.

II. *Methods to be employed for the identification of the Gonococcus in Film preparations.*

Here again the difficulty is with chronic cases with little or no discharge, particularly in the female, where it is not usual to find typical swollen pus cells packed with bean shaped diplococci such as are characteristic of the acute and subacute disease, and where the diagnosis must be made on extracellular pairs or groups of cocci.

The gonococcus is Gram-negative, while the majority of micro-organisms which may be confused with it are Gram-positive. The films should therefore be stained by Gram's method or some modification of the same. Jensen's modification which gives excellent and consistent results is recommended to the exclusion of the original Gram's method.

"Briefly, Jensen (1) discards the aniline water, (2) increases the concentration of the iodine solution, and (3) counterstains by neutral red.

"The exact technique of Jensen's method may be described as follows:—

"1. Make a thin film. If the film be thick or irregular in its thickness, uniform decolorisation becomes impossible and Gram-negative organisms may in parts retain the stain.

"2. Fix in the flame, taking care to avoid overheating. If this be accomplished too rapidly, and the film be subjected to too great a heat, ambiguous results are obtained.

"3. *Let the preparation become cool.*

"4. Stain with a 0·5 per cent. aqueous solution of methyl violet (6 B.) for one quarter to half a minute.[1]

"5. Pour off the mass of methyl violet solution and wash away the remainder with a drop or two of *strong* Lugol's solution (iodine 1 part, potassium iodide 2 parts, distilled water 100 parts). Do not wash off with water.

"6. Pour on a fresh quantity of strong Lugol's solution and leave for one half to one minute.

"7. Wash off the iodine with *absolute* alcohol. This *must* be absolute, *i.e.*, 98 per cent. or over. Weak alcohol tends to decolorise Gram-positive organisms.

"8. Pour on fresh absolute alcohol (98 per cent.), rocking the slide from side to side as in developing a photograph. A third quantum of absolute alcohol may be required to complete the decolorisation. There is gradual decolorisation with absolute alcohol, but only after a length of treatment that is not employed in ordinary routine. It should never be used for more than two minutes.

"9. Finally rinse with a few drops of absolute alcohol, followed immediately, without any intervening washing in water, by a solution of neutral red.[2] Let this act for fifteen seconds to one minute. Gram-positive

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[1]. This solution remains stable for months. A convenient way of applying this is to cut a strip of filter-paper to cover the slide. The stain is then poured on to the filter-paper and allowed to stand for 15–30 seconds. It is then poured off and the iodine poured on. The filter-paper may then be stripped off and some fresh iodine poured on. This method avoids any deposit forming on the film.

[2]. Make up the solution in the proportion of :—

Neutral red	1 gm.
Distilled water	1,000 c. cm.
1 per cent. glacial acetic acid	2 c. cm.

If this be found too weak, a somewhat stronger solution of neutral red may be employed.

organisms which successfully resist exposure to absolute alcohol for two minutes may be decolorised, the gentian violet being masked—(*a*) if the counterstain be in too concentrated a solution, (*b*) if it be made up in a weak alcoholic solution, or (*c*) if when properly prepared its action be prolonged. As a result Gram-positive organisms may appear to be Gram-negative.

"10. Wash in distilled water; dry with blotting-paper and in air, and mount in the usual way.

"To test the individual technique it is recommended that there be kept at hand pure cultures of a known Gram-positive organism, such as the *Micrococcus* (*Staphylococcus*) *aureus*, and of a Gram-negative organism (*e.g.*, *B. coli*), and that parallel films of the two be made and stained side by side with the material under examination.

"*On the limitations of Gram's method in relationship to the diagnosis of gonorrhoea.*

"It deserves note that Gram-positive organisms when taken up and partly digested by leucocytes often lose their Gram-positive character.

"We are of opinion that this limitation does not effect the diagnosis in acute cases, and that in chronic cases the figures provided reduce the danger of confusion with other actual or apparent Gram negative organisms to a minimum."

III. *The Cultivation of the Gonococcus.*

The various media which have been devised are referred to under four categories. It is pointed out that "in the preparation of all these media careful attention to detail in the preparation of the nutrient agar, which is their base, is of great importance." Details for the preparation of some of the media are given in an Appendix (Appendix I).

"For differentiating the gonococcus from other Gram-negative diplococci in culture it should be grown on media containing 1 per cent. of glucose, maltose, and saccharose respectively, with the addition of litmus. The gonococcus produces acid with glucose only."

IV. *Methods for the Production of a Focal Gonococcal Reaction.*

Inoculation or vaccination with a suitable dose of a suspension of dead gonococci is the most direct and most effective method of producing a focal reaction. In metastatic infection the reaction is manifested by increased pain in, or tenderness of, the affected part. In either case there may be a definite rise in temperature with or without malaise. Caution is necessary. There is danger of lighting up a latent iritis or salpingitis, with serious results.

In cases of doubtful urethritis an alternative method is the introduction of a 0·5 per cent. solution of silver nitrate into the urethra.

V. *The Complement Fixation Test.*

After a general review of the development of this test modified by the employment of a polyvalent antigen or of an antigen consisting of a strain selected as having markedly generalized antigenic affinities, its advantages, disadvantages, and limitations are considered.

The conclusion come to is that "while it cannot replace other methods of diagnosis the complement fixation test may, in certain cases, be the only laboratory means by which a gonococcal infection may be diagnosed. It is most likely to be of value in cases of metastatic infection where direct demonstration of the gonococcus may be difficult, if not impossible, and it is in these that the highest proportion of positive results is obtained."

The author of this report cannot at present recommend any one standard method of complement fixation, but he appends the methods of four careful observers, and recommends that in tests made for official returns the method of complement fixation employed be clearly stated.

J. D. T.

i. MALONE (R. H.). **On Certain Fallacies associated with the Use of Laboratory Animals for isolating Pathogenic Micro-Organisms.** *Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 1123–1126.

ii. ——. **A Method of estimating the Degree of Solubility of Micro-Organisms in Bile and "Bile Salt" Solutions.**—*Ibid.* pp. 1144–1146. [2 refs.]

i. When living organisms have been injected into an animal and that animal subsequently dies of general septicaemia the micro-organism to which the septicaemia is due is not necessarily the micro-organism that was inoculated. This is well recognised when the two micro-organisms are totally unrelated, but when they happen to be members of the same or closely related species, only differing from one another in one or more characters, it has, the author thinks, been too readily assumed (especially by investigations of the streptococcus-pneumococcus group) that these slighter differences in character result from a "mutation" or the acquirement of new properties due to animal passage.

Under the heading "The inoculation of a 'bile insoluble' diplococcus intraperitoneally into a young rabbit with the recovery, post-mortem, of a 'bile soluble' strain" the author relates two cases of so-called "mutation" among the capsulated diplococci, both of which he thinks "may be explained without accusing the organisms of behaving in an unorthodox manner." After giving full particulars of Case 1, he shows that though the original culture was obtained from what was considered to be a single colony, yet, when plated out, naked eye inspection of the culture plates showed two distinct types of colony, and when these were subcultured one proved to be "bile insoluble" and the other "bile soluble." The two strains were also distinct as regards their 'serological type.' He concludes that "But for the obvious difference in the appearance of the colonies (*a*) and (*b*) when culture L 38 [the original culture] was plated out, the presence of two distinct strains would have passed unnoticed, and the change from bile insolubility to bile solubility might have been recorded as evidence of 'mutation.'" In case 2, also fully related, two explanationsa re offered:

"(1) J 32 [the original culture] may have consisted of two strains growing in symbiosis. The bile insoluble strain, being less virulent than the soluble strain, disappeared in the animal body while the bile soluble and more virulent strain alone survived.

"(2) The organism ($J.32^1$) recovered from the rabbit may have been an entirely different strain from that injected (J 32). The points in favour of this view are (1) the colonies of J.32 were quite different in appearance from those of $J.32^1$; (2) the extremely low virulence of the original strain J.32 necessitated very large doses of living organisms in the animal passages, thus favouring an intercurrent infection."

ii. The method here described, though applicable to whole bile or any of the bile salts upon other groups of organisms, refers particularly to the action of sodium taurocholate on the members of the pneumococcus-streptococcus group. "The principle of the method is that underlying the use of opacity tubes for the standardisation of vaccines,

namely, that the opacity of a given bacterial suspension is directly proportional to the weight of the bacteria per unit volume of that suspension."

Details of the method and of the requisites for carrying it out are given.

J. D. T.

FREUND (Jules). **New Method for Increasing Yield of Therapeutic and Diagnostic Serum.**—*Jl. Infect. Dis.* 1923. Oct. Vol. 33. No. 4. pp. 328–330.

By the method here described the red cells of the freshly drawn blood are first removed, and the haemoglobin-free plasma allowed to clot. The clot is then subjected to pressure to yield the maximum of serum.

Plasma free from haemoglobin may be obtained either by (1) the addition of chemicals, such as sodium citrate and oxalate, to the freshly drawn blood, or by (2) cooling the blood and maintaining it at a low temperature—the plasma in either case being syphoned off after the cells have settled and before clotting begins.

The technique recommended is as follows :—

"Forty cc. of a 25 per cent. solution of sodium citrate is put in a jar and 3,000 cc. of blood drawn in the same receptacle, the mixture allowed to stand for 12 to 24 hours, preferably at room temperature, because the blood cells separate more quickly at room than at icebox temperature. The plasma is then drawn off into a second jar containing 20 cc. of a 25 per cent. solution of calcium chloride. The clot is formed in 30 to 40 minutes. Three or four hours later the clot is cut in 4 or 5 places and the proper weight, to be described, placed thereon. The serum which is squeezed out is drawn off the following day.

. . . . . .

"The second method prevents clotting by means of cooling : the blood is drawn into a jar and placed in ice water of a temperature from 0 to 1 C. (not higher) for 24 hours. The plasma is syphoned into a second jar and allowed to clot at room temperature, 30 to 40 minutes being sufficient. The remainder of the procedure is carried out as described for the citrated blood method.

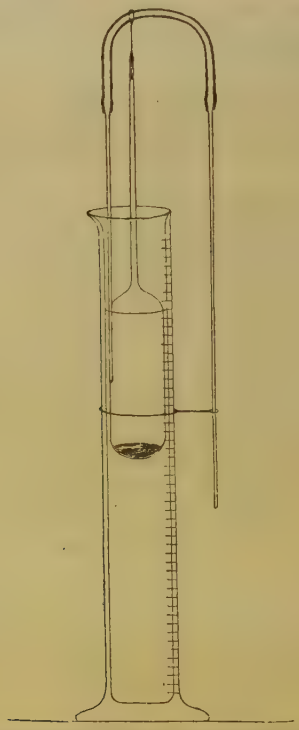
"In both methods, the size of the jar for collecting the blood is 55 by 15 cm. ; for squeezing out the serum, 22 by 18 cm. ; and a weight of 15 pounds is used. The weight was prepared as follows :—Melted paraffin was poured into the jar and strings placed in it while it was liquid. After the paraffin solidified the jar was put in a water bath and heated until the paraffin began to melt. When the outside began to soften the paraffin block was taken out. In order to obtain a negative mold for the weight a plaster paris form was cast. It was found practical in making the form to use 5 per cent. acetic acid instead of water. After removing the paraffin, 15 to 16 pounds of lead were poured into the form, and copper wire to serve as a handle was fixed in the lead before solidification. The weight was then copper plated."

It is claimed for this method that, compared with the method in which withdrawals of serum are made over a period of 8 days, from 10 to 95 per cent. greater yield of serum free from haemoglobin may be obtained—the variation depending on whether the animal has been bled before or not, the larger increase being obtained from animals that have been bled but once.

J. D. T.

TAYLOR (J.). **A Note on a Simple Apparatus for obtaining a Constant Drop Flow of Saline Solution.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. II. No. 2. pp. 639-641. With 1 fig. [1 ref.]

The apparatus described and illustrated is a modification of DREYER & WARD's (*Lancet,* 1921, May 7th), and may be easily made from materials available in most laboratories. It is suitable for workers doing small numbers of tests.



Apparatus for obtaining constant drop flow of saline solution. [TAYLOR (J.).]
[Reproduced from the *Indian Journal of Medical Research.*]

Materials required are a 100 cc. cylindrical measure-glass; a 25 cc. Maynard's pipette (as used for bottling vaccines), with a little mercury to convert it into a float with the bulb about four-fifths submerged; a piece of platinum wire about 2 inches long; 2½ inches of stiff rubber tubing of ⅛ inch diameter; and suitable glass tubing to be drawn out into capillary tubes of suitable length and diameter. The cylindrical measure-glass is selected so that its bore will allow sufficient room for the Maynard pipette together with a capillary tube to move freely up and down. The illustration (here reproduced) shows the apparatus assembled. The platinum wire is shown twisted to form a loop in its centre of such a size as to grasp firmly (without constricting) the rubber tubing, and is fused into the stem of the pipette, which is sealed at the same time. The capillary tube inside the cylindrical measure-glass is cut to such a length as to come an inch or two below the surface of the fluid when the float is in position; and, for outside, one is selected of such a length and diameter as is found experimentally to give the rate and size of drop required. The apparatus may be sterilized with all parts in position.

J. D. T.

LEÃO (Antonio Eugenio De Arêa). **Do Diagnostico das Trypanosomoses pela reacção do Desvio do Complemento.** [Fixation of Complement in Trypanosomiasis.]—*Sciencia Med.* Rio de Janeiro. 1923. Sept. 30. Vol. I. No. 3. pp. 126–134. [12 refs.]

The author describes the material used by him as antigens for this test. Three are prepared from the organs of infected animals and two from the blood. For the former an aqueous, a glycerinated, or an alcoholic extract is made from the spleen, the heart, the liver, or the bone-marrow.

For obtaining the aqueous extract the organ is finely divided and triturated in a mortar; 1 per cent. phenol in distilled water is then added in the proportion of three parts to one of the tissue. The whole is left at room temperature, with daily shaking, for 15–20 days, then filtered and made isotonic by addition of sodium chloride.

For the glycerine extract, glycerine, two parts, is added to one of the tissue for trituration and the mixture is left at room temperature for two or three days, being frequently shaken during this period. It is then filtered and treated with absolute alcohol. The dense precipitate which forms is filtered off, collected and washed with absolute alcohol. The dried residue is emulsified in phenol-saline. It soon deteriorates and is better kept as a powder. For use the powder is triturated with phenol-saline (0·5 per cent. phenol), 1 gm. of the powder to 100 cc. The product is filtered through cotton wool; the resulting opalescent emulsion constitutes the antigen.

The alcoholic extract is prepared in a similar way, using alcohol in place of the water or glycerine. This is not so good an antigen as the others.

Antigens prepared from the circulating blood of infected animals are much more active and reliable. They may be obtained either from haemolysed or non-haemolysed blood. The reaction being a group and not a specific one in the narrow sense, the potency of the antigen depends on the number rather than on the nature of the trypanosomes.

A rat is inoculated intraperitoneally with *T. equiperdum*, 0·1 cc. of a solution containing 10 trypanosomes per field. This would usually prove fatal in 4 days, so the animal is bled on the third day, the blood being collected in citrate-saline, filtered through gauze and centrifuged at high speed for 20–60 minutes. To the deposit which contains the corpuscles and trypanosomes distilled water is added in sufficient quantity to produce haemolysis; the product is again centrifuged. The supernatant fluid is removed and the deposit washed two or three times with normal saline. To this deposit of trypanosomes and corpuscle stroma is added three times its volume of glycerine and normal saline in equal parts. The resulting emulsion is kept at low temperature in the dark. For use, it is diluted 1 in 15 with saline.

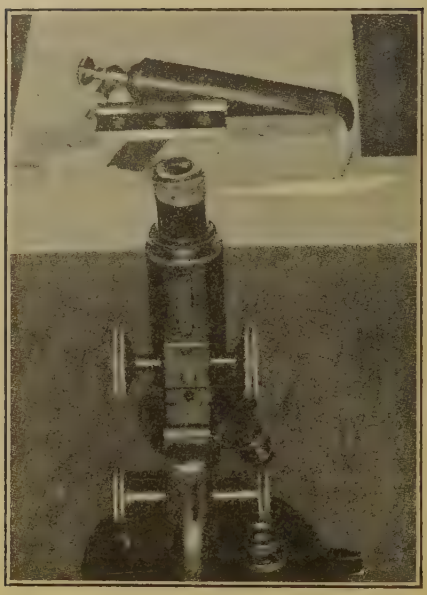
H. Harold Scott.

JOURNAL OF LABORATORY AND CLINICAL MEDICINE. 1923. June. Vol. 8. No. 9. (i) **An Emergency Microtome.** [GLAISTER (Arthur H.).] p. 611. With 1 fig. (ii) **The Estimation of Albumin in Urine.** [QUICK (Armand J.).] pp. 615–618. With 1 chart. [3 refs.]

IBID. Oct. Vol. 9. No. 1 (iii) **A Method of Preparing Uniform Stains.** [COLLINS (C. Creston).] pp. 63–64.

i. In the absence of a microtome, passable sections can be made in the following manner:—

"Place the microscope beside a steady shelf of suitable height, remove the eye piece and fit the draw tube with a cork having a coin cemented on top with sealing wax.



An emergency microtone contrived from a microscope and a safety-razor blade.
[GLAISTER (Arthur H.).]
[Reproduced from the *Journal of Laboratory and Clinical Medicine.*]

"For the knife use a safety-razor blade clamped in a folded hinge which is secured to a block of fairly hard wood with wood screws.

"Freeze the tissue on the coin with a spray of ethyl chloride, and cut by sliding the knife block along a piece of glass secured to the edge of the shelf, adjusting the tissue to the knife with the coarse focus and feeding the desired thickness between cuts with the fine focus."

ii. In this communication it is pointed out that the greatest source of error in estimating albumin in urine by Esbach's method (the results of which are often not even roughly quantitative) lies in the tube itself. The original tube, empirically calibrated, "has been copied and recopied with ever accompanying errors so that now a variety of tubes are found on the market which vary greatly in shape and dimensions." The method, moreover, takes little account of such factors as temperature and the specific gravity of the urine. Experiments were made with three protein precipitating agents and with urines containing known amounts of egg albumen. The effects of temperature and of specific gravity of the urine were also studied. The article concludes with the following summary :—

"1. A comparative study of the modifications of the Esbach method for the determination of protein in urine has been made. Since the available Esbach tubes were unsatisfactory, a new tube was designed and described. Esbach's reagent, Tsuchiya's reagent, and a 10 per cent. trichloracetic acid were studied as precipitating agents. The influence of temperature and of specific gravity of urine were determined.

"2. A 10 per cent. solution of trichoracetic acid as a precipitating reagent was shown to yield the most satisfactory results."

iii. Besides observing the usual precautions to obtain good dyes and chemically pure absolute methyl alcohol (free from acetone) for the preparation of Romanowsky stains, "the mixture should be placed in an amber bottle, stoppered with a greased glass stopper, shaken for twenty minutes each day for ten consecutive days, and allowed to stand for five days more before using. . . . This is a minimum time for the obtaining of uniformly perfect results."

J. D. T.

i. HARVEY (W. F.). **Bacteriological and Laboratory Technique. Section IX. Pathogenic Material Examination.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 1078–1116.

ii. —— **Bacteriological and Laboratory Technique. Section X. Pathogenic Material Examination.**—*Ibid.* 1923. July. Vol. II. No. 1. pp. 119–176.

i. The ninth instalment deals with the examination of pathogenic material, the particular items being numbered from P4 to P4.572. As with former sections, an alphabetically arranged index is appended.

ii. The tenth instalment deals with pathogenic material, the particular items being numbered from P4 to P5.38. It begins with an Introduction acknowledging indebtedness to the works of various authors, to the publications of the Medical Research Council, to the Reports of U.S.A. Health Service, and to the Final Report of the Committee of the Society of American Bacteriologists on Characterisation and Classification of Bacterial Types. The list of abbreviated terminology for genera of organisms given in Sections I and IX is added to in this section; and the section ends, as other sections have done, with an alphabetically arranged index.

J. D. T.

HERRERA (A. L.). **Sur l'imitation des plasmodies et des structures chromatiques avec le silicate de sodium noirci par le noir d'ivoire et des gouttes d'alcool en diffusion.**—*C. R. Acad. Sci.* Paris. 1923. Apr. 9. Vol. 176. No. 15. pp. 1011–1012.

ROSENBERGER (Georg). **Ueber die Technik der Herstellung des Schutzimpfstoffes gegen Fleckfieber nach Rocha-Lima in der Modifikation und Praktik von Weigl.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 5. pp. 129–140. With 4 text figs.

VAN DEN BRANDEN (F.). **Fonctionnement du laboratoire de Léopoldville durant l'année 1920.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 271–274.

MEDICAL ZOOLOGY.

LINS (Abdon Eloy Estellita). **Protozoarios e Protozooses.**—*Arch. Brasileiros de Med.* 1923. Apr., May, Aug., & Sept. Vol. 13. Nos. 4, 5, 8 & 9. pp. 381-409; 534–553; 802–822; 881–909. With 15 text figs. [3 refs.]

These papers appear to form a useful handbook of intentionally limited scope. After describing various well approved processes and methods of laboratory manipulation, and surveying the Protozoa and their several subordinate groups in their structure, natural history, and classification, the author deals individually with the pathogenic Protozoa and several by corresponding protozoan diseases occurring in Brazil.

A. Alcock.

PINTO (Cesar). **Transmissão dos Protozoarios.**—*Sciencia Medica.* Rio de Janeiro. 1923. July 31. Vol. 1. No. 1. pp. 17–36. With 1 fig.

This paper is in catalogue form and consequently does not permit of condensation. It comprises a history, with brief notes, of the subject of the transmission of protozoal parasites of man and some animals. The information in tabular form at the end of the paper will prove very useful, but the notes which precede them are not sufficiently detailed to serve as more than references.

The tables referred to deal with the following points:—1. The various protozoa, with their intermediate hosts and the names of the authorities who have investigated them; 2. A list of the Reduviid bugs and other insects which transmit the *Schizotrypanum cruzi*; 3. The geographical distribution of Brazilian blood-sucking Reduviidae; 4. A list of the Anophelinae which have been shown, experimentally or in nature, to transmit malaria; 5. The geographical distribution of Brazilian Anophelinae.

H. Harold Scott.

FRANCHINI (G.). **Sur les protozoaires des plantes.**—*Ann. Inst. Pasteur.* 1923. Oct. Vol. 37. No. 10. pp. 879–885. [10 refs.]

This is to some extent a summary of a long series of papers contributed by the author during recent years to the *Bulletin de la Société de Pathologie Exotique.*

Following on the discovery by LAFONT of Leptomonas in the milky juice of Euphorbias, the author has demonstrated the existence of Leptomonads and trypanosomes in numerous species of that same genus, and has also succeeded in infecting *E. pilosa* with cultures of the Herpetomonas of the dog-flea and *E. ipecacuanha* with cultures of the kala azar parasite and in cultivating trypanosomes (including *T. cruzi*) in the juice of several other species of Euphorbia. He has also seen various protozoa in plants of other orders having a milky juice—namely flagellates and amoeba in Aselepiads, amoeba and flagellates resembling trypanosoma in *Apocynaceae*, amoeba, trypanosoma and other flagellates in *Urticaceae*, and amoeba in *Artocarpaceae*, *Sapotaceae*, *Menispermaceae*, and *Anacardiaceae*, and also in lettuce. He has also found spirochaetes in *Euphorbia peplis* and flagellates in the tissues of a

sickly cabbage. In some cases he has identified the plant parasites also in the intestine of insects (Hemiptera and Muscidae) living on the plants and presumably distributing infection either by bite or by faex. The author thinks it a legitimate inference not only that these protozoa may be pathogenic to plants, but also that plants may be included among natural reservoirs of protozoa of a wider pathogenic import.

A. A.

BRUG (S. L.). **Protozoölogische Waarnemingen.** [Protozoological Observations.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 4. pp. 620–634. With 3 plates. [20 refs.]

The observations embrace the following:—

1. Two cases in which *Enteromonas hominis* was found in faeces; it differed slightly from DE FONSECA's original description. The author is inclined to accept DOBELL's synonymy.

2. Multiplication stages of *Blastocystis hominis*: several individuals (10–25) were found together in a membrane accumulated round a dark stained body, as described by WENYON and O'CONNOR.

3. The postmortem examination of an old laboratory monkey (*Macacus cynomolgus*) showed the presence of *Entamoeba legeri*, *E. cynomolgi* n.sp. (an entamoeba morphologically identical with *E. kueneni*, and *Endolimax cynomolgi* n.sp. (morphologically identical with *End. nana*). The monkey had been fed with human faeces (containing Lamblia and Blastocystis), but it is considered very unlikely that the faeces of this patient should have contained four species of amoebae which escaped intensive and repeated examination.

4. A simple nutrient medium (agar & coli bacillus) for limax amoebae is described.

W. J. Bais.

REICHENOW (Eduard). **Ueber Darmflagellatenzüchtung und deren Anwendung zum Nachweis der Flagellaten im Stuhl.** [Diagnosis of Intestinal Flagellates by Culture of Stools.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Nov. Vol. 27. No. 10. pp. 367–383. [26 refs.]

With reference to a paper by HEGNER and BECKER on the diagnosis of intestinal flagellates by culture of stools (see this *Bulletin*, Vol. 20, p. 440) the present author discourses at considerable length on his own experience of the matter. He concludes that for Trichomonas and Chilomastix culture is a useful method, being conclusively reliable for the former and confirmatory of the microscope for the latter. He goes rather needlessly out of his way to point out that the method is, at present, useless for other classes of intestinal protozoa.

A. A.

DA CUNHA (Artistides Marques) & PACHECO (Genesio). **Recherches sur les flagellés intestinaux de l'homme.**—*C. R. Soc. Biol.* 1923. Oct. 13. Vol. 89. No. 27. pp. 765–767.

Among 82 individuals examined during two years at Rio de Janeiro, chiefly children with intestinal complaints, the authors have encountered Trichomonas 19 times, Chilomastix 10 times, Giardia 10 times, Enteromonas 7 times, and Tricercomonas 3 times. For cultivation of these

flagellates they have found the best media to be serum, or ascitic fluid, or cerebrospinal fluid, diluted with normal saline solution. They are convinced from observations of both forms, both in the living state and after staining, that *Enteromonas hominis* Fonseca and *Tricercomonas intestinalis* Wenyon & O'Connor are distinct species.

A. A.

LIBERT (E.) & LAVIER (G.). **Sur l'habitat de** *Giardia intestinalis* **chez l'homme. Précisions fournies par le tubage duodénal.**—*Bull. Soc. Path Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 589–592. [10 refs.]

After some retrospective remarks on the question of the exact enterographical distribution of Giardia the authors give particulars of three cases in which this parasite was located in the duodenum by tubage operations.

A. A.

HOLLANDER (Edward), *Giardia intestinalis* **Infection.**—*Arch. Intern. Med.* 1923. Oct. 15. Vol. 32. No. 4. pp. 522–529. [32 refs.]

In the course of 170 operations of duodeno-biliary drainage, during the last 2½ years, in New York, the author has encountered 9 cases of infestation with *Giardia intestinalis*, 3 of which submitted to treatment, by intravenous injection of arsphenamin at 3 to 5-day intervals. One case is said to have been cured by 3 injections, as judged by disappearance of cysts from stools 72 days after the third injection. In another case, in which three arsphenamin injections were alternated with three duodenal lavages of 30 per cent. solution of magnesium sulphate, the duodenal contents, examined on fourteen occasions during the following six months, were free from the parasite. In the third case cysts and active forms of the parasite were present in the stools 19 days after a treatment of 3 injections of arsphenamin.

A. A.

PAILLOT (A.). **Sur une nouvelle flagellose d'insecte et un processus d'infestation naturelle non encore décrit.**—*C. R. Acad. Sci.* 1923. Aug. 20. Vol. 177. No. 8. pp. 463–465. With 2 figs. [1 ref.]

The author has observed a Leptomonas—*L. chatoni*, a new species—in the blood of some caterpillars of the Noctuid moth *Agrotis pronubana*; it exhibits considerable polymorphism. All the parasitized caterpillars were also parasitized by the larva of an Ichneumon-wasp, *Amblyteles armatorius*. All the caterpillars, however, that were free from the Ichneumonid larva were also free from the Leptomonas. The author therefore surmises that the Leptomonas is transmitted from infected to healthy caterpillars by the ovipositor of the Ichneumon-wasp in the act of depositing its eggs in its victims.

A. A.

WADA (Yoshitsune). **Vergleichende Untersuchungen ueber die Wirkung einiger Saponine auf rote Blutkorperchen und Trypanosomen.** [The Action of Saponins on Red Corpuscles and Trypanosomes. A Comparative Study.]—*Biochem. Ztschr.* 1922. Vol. 130. pp. 299–303.

The object of the experiments here recorded was to determine the trypanocidal effect of saponin as compared with its haemolytic effect—*T. equiperdum* being the subject employed. The author premises that under

the name of saponin are included vegetable products of which the haemolytic property is most extremely variable. In his experiments he used saponin (without qualification), saponin from guaiacum-bark, saponin from horse-chestnut, cyclamin, and solanin. The tabulated results show that all these substances are in various degrees haemolytic and trypanolytic, and that though the more haemolytic are the more trypanolytic, the respective concentration standards for haemolysis and trypanolysis are not in corresponding proportion throughout the series. Thus cyclamin—which is the most strongly haemolytic, though not the most strongly trypanolytic of all—has a minimum concentration for trypanolysis ten times less than that required for haemolysis, and in general the trypanolytic effect is most marked in those saponins of which the haemolytic concentration minimum is above 1 part in 10,000.

A. A.

i. ERBER (Berthe). **Action du serum de quelques vertébrés inférieurs sur les trypanosomes,** *in vitro,* **après injection de peptone.**—*C.R. Soc. Biol.* 1923. July 21. Vol. 89. No. 25. pp. 513–514.

ii. ——. **Modification du pouvoir trypanolytique de la lymphe des batraciens,** *in vivo,* **sous l'influence d'injections de peptone.**—*Ibid.* pp. 515–516.

1. The injection of peptone diminishes the trypanolytic power, *in vitro,* of the serum of certain mammals, and experiments are here briefly described showing that the same thing holds good for the serum of the eel and of the individual viper, but not for the serum of the toad, salamander, and slow-worm lizard.

ii. The serum and lymph of Batrachia is strongly haemolytic to mammals, and is also trypanolytic, and experiments are here briefly described showing that the injection of peptone (10 per cent. solution) diminishes these powers *in vitro.*

A. A.

CHATTERJEE (G. C.). **On a Tetrachilomastix n.sp. parasitic in Human Intestine.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 177–180. With 2 plates. [8 refs.]

Said to be "very commonly found in India, in the stools of patients suffering from chronic intestinal complaints," but to seem to have "not much pathogenic property."

A. A.

WASSELL (Corydon McAlmont). *Isospora hominis* **discovered in China.**—*China Med. Jl.* 1923. Aug. Vol. 37. No. 8. pp. 661–663. With 1 text fig. [3 refs.]

The faeces in the subject of this case contained, besides oocysts of *Isospora hominis,* eggs of *Schistosoma japonicum* and *Ancylostoma duodenale* and cysts of *Giardia intestinalis.* The patient, an emaciated Chinaman with a much enlarged spleen, had, as items in his medical history, ascites, malaria, chronic bronchitis, and the forty-years' duration of stools containing blood and mucus; he was an indigent son of the soil and stated that, until he came 25 miles to Wuchang for treatment, he had never been so far away from home.

A. A.

RHODE (J.). **Ein Coccidienbefund** (*Isospora hominis*) **in dem Stuhl eines deutschen Kriegsteilnehmers aus der Türkei.**—*Klin. Woch.* 1923. June 25. Vol. 2. No. 26. p. 1222. With 2 figs. [5 refs.]

Finding of cysts of *Isospora hominis* in the stool of a German engaged in the war in Turkey.

A. A.

BEN-HAREL (Shulamite). **Studies of Bird Malaria in Relation to the Mechanism of Relapse.**—*Amer. Jl. Hyg.* 1923. Nov. Vol. 3. No. 6. pp. 652–685. With 3 plates & 9 figs. [24 refs.]

These studies of Proteosoma included 23 canaries infected from an original source in sparrows in New York.

Three types of infection were observed, namely: acute (4 cases); "extended irregular," which the author is disinclined to call chronic (16 cases); and benign (3 cases). *Acute infections* lasted 5 to 10 days, showed an immediate decrease of red cells after inoculation and another rapid decrease at the end of the incubation period (12 to 23 days), and then a returning increase, a large percentage being young forms, as the parasites decreased. In the *protracted and irregular infections* large fluctuations occurred in the number of parasites visible, and as the parasites increased the red cells decreased, and *vice versa*; a gradual decrease of red cells was observed during the incubation period. *Benign infections* were short and very mild; the changes in the red cell and parasite counts were similar to those described but less pronounced. In all infections the large uninuclear leucocytes increased and decreased in correspondence with the parasites.

Changes in the spleen and bone-marrow were periodically observed. In the *spleen* at the height of infection the endothelial cells were distended and contained large quantities of pigment, the capillaries were blocked with parasitized red cells, large uninuclears and mitotic forms were increased, and young parasites were present both free and attached to uninuclears. The pathological changes were greatly diminished in spleens examined at the end of the peripheral infection, and were not to be seen at all in spleens examined at intervals in latent (protracted) infections. In the *bone-marrow* in heavily parasitized birds the changes observed were decrease in adipose tissue and a preponderance of mitotic forms and uninuclears; dilatation of the venous capillaries; hyperplasia; and the presence of parasites both free and in red cells. At the end of infection the bone-marrow was recovering, and at different stages in a latent infection no significant pathological changes were observed.

Parasites at the height of infection were found in brain, liver, and kidney, but most of all in the spleen and bone-marrow; and towards the end of the infection, and during apyretic intervals, only in the spleen and bone-marrow. Up to six months after infection had disappeared from the blood a few parasites were found in the tissues after prolonged search. The parasites demonstrated were in various stages—trophozoites, schizonts, and gametocytes.

Relapses. Studies of the course of infection, of tissue-smears and sections, and of spontaneous and experimentally provoked relapses added convincing evidence in favour of the hypothesis that during non-febrile intervals parasites are present in certain internal organs as well as in very small numbers in the blood, where they continue the process of nonsexual reproduction.

[Although there may be nothing wonderfully novel in the results of these studies, yet the record of continuous and comprehensive observations of a considerable series of infections is of the greatest value.]

A. A.

SERGENT (Étienne), SERGENT (Edmond) & CATANEI (A.). **De la vaccination contre le paludisme des oiseaux, obtenue par l'inoculation d'un petit nombre de sporozoïtes vivants.**—*C. R. Acad. Sci.* 1923. July 30. Vol. 177. No. 5. pp. 364–366. [2 refs.]

Continuing their experiments on the induction of bird malaria (this *Bulletin*, v. 20, p. 303) the writers found that in 25 canaries injected with a suspension corresponding to two-thirds or three-quarters of a Culex normally infected with sporozoits, there occurred in 5 an intense infection, in 13 a very feeble one followed by an immunity, and in 7 neither infection nor immunity.

Clayton Lane.

SENEVET (G.) & WITAS (P.). **Évolution spontanée de l'infection à *Haemoproteus columbae* chez deux pigeons.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 481–488. With 1 chart. [7 refs.]

Infections of Haemoproteus in two individual pigeons are here described and contrasted. One pigeon was infected when it was a squab, either all at once or several times at very close intervals. This infection occurred early in September 1920, and parasites appeared in abundance in the blood on the 27th September and continued in decreasing numbers until the 21st January 1921—about 4 months ; on the 4th February they were again abundant until the 28th March, when they again disappeared ; on the 19th August they re-appeared again, and disappeared on the 27th September, and since then they have no more been seen in repeated examinations throughout a whole year. The course of affairs is interpreted as a primary infection followed at lengthening quiescent intervals by two relapses, and then by (possibly) spontaneous cure. Both in the primary infection and in the relapses the parasites appeared in swarms in the ring form and gradually disappeared as much larger and sparser forms.

The other pigeon was of unknown age and had been infected for a long time, and probably many times, before being isolated for observation. In it also the parasites appeared and disappeared in the blood at intervals, but their appearances were more protracted, and their disappearances were shorter and less complete ; and they did not make their appearance in swarms of small rings, though they disappeared as very sparse large gametes. Finally they disappeared altogether so far as examinations continued for a year went. It must, of course, be understood that both pigeons were properly protected from reinfection during the long terms of observation.

The authors remark that comparable phenomena are to be seen in human malaria. In Macedonia primary infections with a well-marked rhythmical relapse of parasites and fever were to be seen in the French army : among the natives of Algeria such distinct rhythm of relapse is not easy to recognize.

A. A.

SINTON (J. A.). **The Occurrence of *Balantidium coli* in the Faeces of an Indian.**—*Indian Med. Gaz.* 1923. Sept. Vol. 58. No. 9. pp. 432–433. [4 refs.]

Balantidium coli observed in the faeces of a native of Jhang, in the Punjab, a prisoner for 11 years in the Lahore jail. The stools were well formed and showed a few streaks of mucus and a little pus.

The Editor of the I.M.G. states in a footnote that this ciliate is said to be "relatively common" in pigs and sheep in tea-garden coolie-lines in Cachar, and also that a species of Balantidium has been seen in 2 of 4 pigs recently examined in Calcutta.

A. A.

BUISSON (Jean). **Sur quelques infusoires nouveaux ou peu connus parasites des mammifères.**—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Aug. Vol. 1. No. 3. pp. 209–246. With 21 figs. [47 refs.]

The first part of this paper contains diagnoses and figures of new genera and species of ciliates from the intestine of the African rhinoceros and elephant, the roe-deer, and the agouti. The second part is a complete revision, with diagnoses and some figures, of the ciliates known to be harboured in the alimentary tube of mammals.

A. A.

ARAGÃO (Henrique de Beaurepaire). [In Portuguese and French.] **Estudos sobre os Blastocystis. Études sur les Blastocystis.** *Mem. Inst. Oswaldo Cruz.* 1922. Vol. 15. No. 1. pp. 240–250. [Portuguese] [22 refs.]; 143–151 [French]. With 2 plates.

After reviewing the opinions of various workers on the nature of Blastocystis, the author describes and figures the structure and growth and multiplication of this enigmatic organism and comes to the following conclusions.

Blastocystis is not an evolutionary phase of any other animal or vegetable parasite, but is an independent parasite related to the Blastomycetes and particularly to the pathogenetic Saccharomycetes. It has two methods of prolification, namely (*a*) plasmotomy, or binary fission, which is the ordinary method, and (*b*) "sporulation," by formation of an encysted nest of secondary cysts something like ascospores in an ascus—a much rarer method. The existence of several species of Blastocystis is not sufficiently established. Blastocystis has no pathological significance.

A. A.

LYNCH (Kenneth M.). **The Occurrence of Blastocystis in Intestinal Inflammation, with a Note on** *Endolimax nana.*—*Jl. Amer. Med. Assoc.* 1923. Aug. 18. Vol. 81. No. 7. pp. 522–523. With 1 fig. [6 refs.]

Critical abstract of a case of acute diarrhoea, with passage of some blood and mucus, passing to a state of relapsing painless diarrhoea, accompanied with tenderness of rectum lasting for three months. In the mucosa of the inflamed rectum numerous small ulcers swarming with Blastocystis were observed—probably *B. hominis.* *Endolimax nana* also was present in the stools, but was not seen in the smears from the ulcers. The patient was otherwise in good condition and had a clean history, so that the author, who maintains a cautious and critical attitude, is inclined to agree with those who do not regard Blastocystis as harmless.

A. A.

VASCONCELOS (Angel Brioso). **The Algae of the Genus Chara and Mosquito Larvae.**—*Amer. Jl. Public Health.* 1923. July. Vol. 13. No. 7. pp. 543–546. With 1 fig. [7 refs.]

An account of the observed effects upon Culex larvae of water containing growing Chara [the evidence attributing the effects entirely to Chara, however, not being scrupulously free from ambiguity].

The author placed a plant of *Chara gymnophylla* [the genus Chara is ubiquitous in stagnant water] in a small wooden trough of water. Ten days afterwards he noticed that "an enormous number of Culex

larvae had invaded" the water, and he killed them off with "a film of coal oil." Next day he flushed off the oil very thoroughly. Within the next 48 hours he observed a fresh swarm of Culex larvae in the trough, but they were all dead or moribund. Thinking that this disastrous state of the larvae was due to the remains of coal oil, he changed the water several times, and thereafter for two weeks—during which again the water was frequently changed—larvae appeared in the tank but were always dead or dying. The author's good intentions and preparations for rigorous experimentation were frustrated by the lateness of the season, but he is confident in his inference that *Chara gymnophylla* is a larvicide. [On this subject see this *Bulletin*, Vol. 15, p. 154; Vol. 17, p. 116; and Vol. 19, p. 113.]

A. A.

PARDO (L.). [**Observaciones acerca de la accion de la** *Chara* **sobre las larvas de los mosquitos.**]—*Bol. R. Soc. españa Hist. nat.* Madrid. 1923. Mar. Vol. 23. No. 3. pp. 154–157. [Summarized in *Rev. Applied Entom.* 1923. Oct. Vol. 11. Ser. B. Pt. 10. p. 160.]

These observations, made in Valencia rice-fields, confirm the inhibitory influence of Chara upon mosquito-breeding. *C. hispida*, which also can grow in deeper water, was found to be more efficacious in this respect than *C. foetida*.

A. A.

ALLUAND (C.). [**Rapport à Monsieur le Directeur Général des Services de Santé du Maroc sur une Mission antipaludique.**]—*Bull. Soc. Sci. nat. Maroc.* Rabat. 1922. Mar. 1. Vol. 2. No. 1–2. pp. 3–6. [Summarized in *Rev. Applied Entom.* 1923. July. Vol. 11. Ser .B. Pt. 7. p. 127.]

The interesting item of this report is the testimony that the species of Chara are of value in mosquito control. In Morocco no mosquito larvae have been found in water where *Chara connivens* is growing.

A. A.

CONNOR (M. E.) & MONROE (W. M.). **Notes on the Length of Time** *Aëdes calopus* (*Stegomyia*) **Larvae should be exposed to a Film of Kerosene.**—*Jl. Econom. Entom.* 1923. Aug. Vol. 16. No. 4. pp. 380–385.

This is a question that interests sanitary inspectors on the eastern coast of America where specially prepared softened water is used by washermen and is too valuable to be thrown away and too strongly alkaline for little fishes. Treating this water for 15 minutes with petroleum was found sufficient to destroy all the Stegomyia larvae, and treatment given for 5 to 10 minutes killed most of them.

A. A.

ROUBAUD (E.). **Les désharmonies de la fonction rénale et leurs conséquences biologiques chez les moustiques. Les faits et leurs applications.**—*Ann. Inst. Pasteur.* 1923. July. Vol. 37. No. 7. pp. 627–679. With 2 figs. [9 refs.]

The author appears to regard the life-cycle of *Anopheles maculipennis* as governed by a something which is indicated in the state of the Malpighian tubules. The larvae are apt to become asthenic by ingestion of their own nitrogenous excreta, and when kept in considerable number

in an insufficiency of water they die with their Malpighian tubules hypertrophied ; extensive tracts of water are therefore a necessity of their well-being. This argument explains why in places where larvae are obviously plentiful the adult insects are scarce, and where adults are plentiful larvae are hard to find. In the adult stage the dominating influence of the Malpighian function is manifest in the hibernation of the female. Hibernation, or "athermobiosis," is not, as most people suppose, a torpid state caused by cold, but is an inherent specific cyclical asthenic sterility, independent of cold, and characterized by hypertrophy of the Malpighian tubules and development of fat instead of eggs. Hibernating Anopheles are insects overloaded with nitrogenous waste and stricken with asthenia. If we reflect that in spring a new biological cycle begins, hibernation may be regarded as the obligatory purificative phase of rejuvenescence. The practical conclusion from these ingenious speculations—namely, that the time for dealing with Anopheles is in this cyclical phase of asthenia and renal insufficiency—is not so new and strange as the general argument. It agrees well with the obvious conclusion that the species is offering itself to destruction, locally, when the sluggish females are congregated in their winter shelters.

A. A.

HAROLD (C. H. H.). **The Breeding of** *Anopheles maculipennis* **Meigen in Captivity.**—*Jl. Roy. Army Med. Corps.* 1923. Oct. Vol. 41. No. 4. pp. 282–290.

[Everyone who has tried it knows how difficult it is to rear that useful insect *Anopheles maculipennis* in the laboratory. It is easy enough to get fertile eggs from females caught in the spring, and to get happy young larvae from these eggs. But do what you will for their sustenance and comfort, the larvae sooner or later get sick, their mortality after the third moult becomes heartrending, and the final issue of several thousand eggs is, perhaps, a score of dwarf adults.]

At Aldershot, after several disappointments, Major Harold has succeeded not only in carrying one generation of *Anopheles maculipennis* through all the vicissitudes of larval life, but also in breeding their adult issue to the third generation, all within the walls of his laboratory.

The experiments were begun at the end of October and carried on through the winter, the first complete success being obtained in the later half of February. The laboratory is part of a wooden Army hut ; it was heated by electric radiators, and atmospheric humidity was maintained by evaporation from the breeding tanks. The adult insects were fed at least twice a week on a partially-clipped rabbit, those that were disinclined to accept the rabbit could be induced to do so by an appetizing feed of banana ; they were kept in ordinary mosquito cages, 20 × 24 × 20 inches, furnished with a small vessel of water. The larvae were reared in ordinary large glass tanks ; and the medium most conducive to their quick growth and complete development was "a septic and evil-smelling" water, free, of course, from surface scum and from predatory aquatic insects, in which floating plants of forget-me-not (*Myosotis palustris*) were allowed to decompose. For successful breeding it was found that large numbers of recently emerged males and females must be in the cage ; in such circumstances great excitement was observed to occur towards nightfall, and one night a pair were observed *in copulâ* on the side of a cage.

A. A.

ZETEK (James). **Anopheles breeding among Water Lettuce—a New Habitat**—*Proc. Med. Assoc. Isthm. Canal Zone.* 1920. Jan.-Dec. Vol. 13. Pts. 1 & 2. pp. 25–28. [4 refs.]

INGRAM & MACFIE, in Accra, found larvae of *Anopheles costalis* and *marshalli* in the floating rosettes of *Pistia stratiotes*, and the present author now reports finding larvae of *A. albimanus* and *tarsimaculatus* in the same specific Pistia harbourage, in waters of the Panama Canal zone. He has also observed Anopheles larvae sheltering in sheets of the ordinary small duckweed in those waters.

A. A.

i. BULL (Carroll G.) & KING (W. V.). **The Identification of the Blood Meal of Mosquitoes by Means of the Precipitin Test.**—*Amer. Jl. Hyg.* Baltimore. 1923. Sept. Vol. 3. No. 5. pp. 491–496.

ii. KING (W. V.) & BULL (Carroll G.). **The Blood Feeding Habits of Malaria-carrying Mosquitoes.**—*Ibid.* pp. 497–513. With 1 fig. [1 ref.]

iii. BULL (Carroll G.) & ROOT (Francis M.). **Preferential Feeding Experiments with Anopheline Mosquitoes. I.**—*Ibid.* pp. 514–520. With 1 text fig. [6 refs.]

These papers form a trilogy.

i. In this paper are described the technique of the preparation of the sera used for identification of the blood found in the stomach of individual mosquitoes, and the method and results of the preliminary experimental investigation of their practical application. The blood was removed from the stomach of the dissected mosquito on filter paper, upon which it remained good for use for 3 or 4 months ; if allowed to dry in the stomach of the mosquito it did not give satisfactory reactions. Multiple reactions were a great obstruction. Many specimens gave no reaction with the specific sera prepared (man and common domestic animals). Blood meals of mosquitoes were easily identified if the stomach had been got within an hour of feeding ; a large percentage also from stomachs got 12 hours after feeding could be depended upon unless the insect had been kept in the ice-chest. Frequent failure of reactions with antihuman serum was a weak point.

ii. In the course of a study of malaria-carrying mosquitoes (chiefly *Anopheles quadrimaculatus*) in a plantation district in Louisiana, contents of the individual stomachs of a large series of insects were identified by the blood precipitin test described in the above paper. The insects were collected throughout the mosquito-season from representative houses in an area of about 5,000 acres ; the blood identifications were made at Baltimore, each specimen being tested with 8 precipitin sera (man, horse, ox, dog, pig, sheep, cat, fowl) ; only definitely positive tests are included in the record. Practically 45 per cent. of the mosquitoes collected about dwelling-houses were found to contain fresh blood. Taking the whole collection throughout the season, from the entire area, the general averages of hosts were : cow 35·7 per cent., horse 32·6, pig 16·1, dog 8·3, man 4·3, fowl and cat together 3·0. The figures, of course, give no exact indication of food preferences. As the abundance of mosquitoes increased the proportion feeding on man appeared to decrease, probably because of the stimulus given to defensive measures. A very small proportion (slightly more than 1 in 1,000) of a large number of Anopheles examined contained sporozoites.

iii. The design of the ingenious and careful experiments recorded in full detail in this paper was to ascertain whether mosquitoes are guided by predilection, or merely succumb to propinquity, in satisfying their desire for blood. The dramatis personae were female *Anopheles quadrimaculatus*, horses, cows, and men ; and a hexagonal mosquito-proof shed, divided into six equal and similar stalls in such a way as to allow the introduced insects a free flight into all parts or any particular part desired, provided the stage and scenes. The following tests are recorded :—

(*a*) Horse A and cow A, stalled apart, and 250 insects liberated at dusk ; next morning 10 insects found gorged, 9 on cow, 1 on horse blood.

(*b*) Two horses (one being horse A) and cow A, severally stalled in such a way as to interpose a horse between the cow and the site of liberation of mosquitoes ; next morning 30 insects found gorged, 13 on horse, 17 on cow blood.

(*c*) Four horses and cow A, severally stalled, so that two horses were interposed between cow and liberated mosquitoes ; next morning, 60 insects found gorged, 40 on horse, 20 on cow blood.

(*d*) Old horse A and fresh cow B, stalled apart as before ; next morning, 38 insects found gorged, 23 on horse, 15 on cow blood.

(*e*) First experiment with horse A and cow A repeated twice ; of 53 and 46 gorged insects found, 20 and 10 contained horse, 33 and 36 contained cow blood.

(*f*) Horse stalled next to a stall where 2 men slept with face and neck and arms exposed ; next morning 111 insects found gorged, 51 on human, 56 on horse blood.

(*g*) Experiment *f* repeated with two horses arranged so that the insects had to pass horses before reaching men ; of 68 gorged insects, 20 had human, 48 had horse blood.

(*h*) Cow stalled next to a stall occupied as before by 2 men ; next morning, 122 insects found gorged, 91 on cow, 31 on human blood. This experiment was repeated four times, in each case more mosquitoes fed on cow than on man, the ratios being 1 to 4, 1 to 3, 1 to 2 and 1 to 7.

The authors regard the experiments as preliminary ; cool nights and the premature close of the Anopheles breeding season restricted their scope.

A. A.

LEGENDRE (J.). **Sur la zoophilie de certains moustiques et son application à la prophylaxie.**—*C. R. Acad. Sci.* 1923. Oct. 22. Vol. 177. No. 17. pp. 790–793. [3 refs.]

Knowing for many years a locality in Brittany where the mosquitoes —*pipiens* and *Anopheles maculipennis*—never bite man, the author applied himself for three summer months to the study of this question. He satisfied himself that in this Breton locality *Culex pipiens* has become "androphobe," and that *Anopheles maculipennis*, though its larvae may be found in domestic waters along with those of *C. pipiens*, does not bite man and is not even seen in houses. He therefore recommends that into places where these species *do* attack man stocks from places where they are known not to attack man should be introduced, to supplant them there.

A. A.

HARGREAVES (E.). **Entomological Notes from Taranto (Italy) with References to Faenza, during 1917 and 1918.**—*Bull. Entom. Res.* 1923. Oct. Vol. 14. Pt. 2. pp. 213–219. With 2 maps in text.

These notes include observations of *Anopheles maculipennis, bifurcatus,* and *superpictus,* but nothing new. Experiments with larvae of *A. bifurcatus* showed that they could not live as long as three days in a 0·005 per cent. solution of copper sulphate, and that solutions of that strength were more rapidly fatal than solutions of 0·1 and 0·05 per cent.

A. A.

RODENWALDT (Ernst). **Entomologische Notities II.** [Entomological Notes II].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 4. pp. 500–507. With 1 map. [1 ref.]

Contains much miscellaneous information. Some data point to the probability of *A. maculatus* being the malaria carrier on the island Alor; the *A. maculatus* was never before found to transmit malaria in the D.E. Indies.

W. J. Bais.

i. GALAMINI (Antonio). **La fauna anofelica della Maremma Grossetana e la lotta invernale contro la malaria.**—*Ann. d'Igiene.* 1923. Sept. Vol. 33. No. 9. pp. 627–639. [1 ref.]

ii. ZETEK (James). **The Panama Canal Species of the Genus Anopheles.**—*Proc. Med. Assoc. Ishm. Canal Zone.* 1920. Jan.–Dec. Vol. 13. Pts. 1 & 2. pp. 29–56. With 6 figs. [21 refs.]

iii. PINTO (Cesar). **Anophelinas de Angra dos Reis.**—*Brazil Medico.* 1923. Aug. 4. Year 37. Vol. 2. No. 5. pp. 77–81. With 10 figs.

iv. BUXTON (P. A.). **Anopheles Larvae from Palestine and Elsewhere.**—*Bull. Entom. Res.* 1923. July. Vol. 14. Pt. 1. pp. 75–82. With 9 text figs. [9 refs.]

v. SERGENT (Edm.) & FOOT (Katherine). **De l'utilisation des tritons pour la destruction des moustiques.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 489–493.
RIVET (L.). **Utilisation des tritons pour la destruction des moustiques.**—*Presse Méd.* 1923. Aug. 4. Vol. 31. No. 62. pp. 1296–1297. [1 ref.]

i. The war against the Anopheles of the Maremma is much easier to wage in winter than in summer. Of the three local species *A. maculipennis* and *superpictus,* which hibernate as adults, can be destroyed in the stalls and stables where they congregate in winter, while the waters in which the larvae of *A. bifurcatus* pass the winter are less extensive at that season.

ii. This useful paper, which, besides describing the local species and their respective larvae, contains ample instructions for collecting and observing them and for recording all classes of facts observed, is intended for local sanitary inspectors.

iii. Figures and diagnoses of local, well-known, species.

iv. Comparisons of the larva of *Anopheles algerienis* and of *A. sergenti* with other species to which, respectively, they are akin.

v. A spirited account of the doings of young newts among mosquito larvae. [Newts, like other tailed Amphibia, are very sparely represented outside the northern temperate region.]

A. A.

WHITTINGHAM (H. E.). **Life-History of the Sandfly,** *Phlebotomus papatasii.* (**Abstract.**)—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1923. Aug. Vol. 16. No. 10. p. 45.

Whittingham is to be congratulated on his protracted and laborious study of *Phlebotomus papatasii,* in Nature and in the laboratory.

The natural cycle, from extrusion of egg to emergence of adult, under suitable conditions of temperature and moisture, occupies about 6 weeks ; but hibernation may normally occur in the prepupal stage, and by increasing the moisture, or lowering the temperature, of the atmosphere the larva stage may be prolonged experimentally for at least 6 months ; the life of the adult may be prolonged in the laboratory to 30 days or more. Under normal conditions the egg hatches in 9 days, the larva has four instars of about 6 days each, the pupa stage lasts 9 days, and the adult female lives about 2 weeks.

The female sucks blood during the first 24 hours of life ; pairing may occur in the next 24 hours ; and eggs to the number of 40 are produced 6 to 10 days later.

The R.A.F. Sandfly Fever Commission has shown that the virus of Phlebotomus fever is transmitted from generation to generation, in two possible ways—either by inheritance or by the larva feeding on the excreta or dead bodies of infected parents in the breeding grounds.

A. A.

i. HILL (Gerald F.). **A New Australian Phlebotomus (Dipt. Psychodidae).** —*Bull. Entom. Res.* 1923. July. Vol. 14. Pt. 1. pp. 83–86. With 6 text figs.

ii. SINTON (J. A.). **Notes on Some Indian Species of the Genus** *Phlebotomus.* **Part II.** *Phlebotomus squamipleuris,* **Newstead. 1912.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 65–78. With 2 plates. [2 refs.]

iii. BAYMA (Theodoro). **Biologia do "Phlebotomus Papatassi."**—*Ann. Paulist. Med. e Cirurg.* 1923. July-Aug. Year 11. Vol. 14. Nos. 7–8. pp. 67–69. With 6 text figs.

i. *Phlebotomus queenslandi* (n.sp.), described and figured—from the residential quarters of Townsville.

ii. *Phlebotomus squamipleuris,* originally discovered in the Sudan, is here recorded from the Punjab, the Central Provinces of India, and Madras, and is described in great detail.

iii. There is nothing new in this paper, which appears to refer to *Phlebotomus minutus.*

A. A.

GLASER (R. W.). **The Survival of Bacteria in the Pupal and Adult Stages of Flies.**—*Amer. Jl. Hyg.* Baltimore. 1923. July. Vol. 3. No. 4. pp. 469–480. [13 refs.]

This paper deals not with known pathogenic bacteria but with the normal bacterial flora of flies' intestines. It also contains a summary of the observations of FAICHNIE, BACOT, LEDINGHAM, NICOLL, and

GRAHAM-SMITH on the survival through the pupa and imago stages of pathogenic bacteria ingested in the larva stage, as well as references to the publications of other observers.

The author carefully sterilized the outer surface of pupae of house-flies, stable-flies, and horn-flies and found by culture that they contained within them bacteria which must have been ingested in the larva stage. He also sterilized the outer surface of just-emerged house-flies and found that they also contained bacteria within them, which had been passed on from the larva stage. The Stomoxys pupae contained fewer bacteria than the house-fly pupae, and the Lyperosia pupae very few at all. [Cp. experiments of WOLLMAN, this *Bulletin*, Vol. 18, p. 200.]

A. A.

PATTON (W. S.). **Some Philippine Species of the Genus *Musca* Linnaeus.** —*Philippine Jl. Sci.* 1923. Oct. Vol. 23. No. 4. pp. 309–322. [4 refs.]

Eleven species are dealt with critically, the diagnostic characters, habits, and necessary synonymy of each being given, as well as a key for their individual identification. Of the species of Musca generally, the author recommends separating them in 3 groups, namely (1) those that, like the house-fly, pester man in his dwellings and bazaars, do not bite, and lay their eggs in garbage and excrement of any kind ; (2) those that pester animals, feed on their wounds, etc., though they do not actually bite, and breed chiefly in cow-dung ; and (3) those, including Philaematomyia, that bite and suck blood and breed only in cow-dung.

A. A.

PATTON (W. S.). **A New Oriental Species of the Genus *Musca* with a Note on the Occurrence of *Musca dasyops* Stein in China and a Revised List of the Oriental Species of the Genus *Musca* Linnaeus.** *Phillipine Jl. Sci.* 1923. Oct. Vol. 23. No. 4. pp. 323–335. [4 refs.]

Twenty-nine species of Oriental Diptera are here admitted as valid and are listed with their several synonymies, conclusive or conjectural, and with occasional necessary notes. As the author has been at the great pains of searching out and examining the type specimens of 53 proposed Oriental species, his final determinations have an extraordinary value.

A. A.

SIMMONS (Perez).—**A House Fly Plague in the American Expeditionary Force.**—*Jl. Econom. Entom.* 1923. Aug. Vol. 16. No. 4. pp. 357–363.

Description of an insanitary camp at Lamanchs, in south-western France, and an infinite torment of flies. An epidemic of dysentery was followed by epidemic influenza and pneumonia, and the opinion is expressed that the severity of the two last diseases was a consequence of the fly-borne dysentery. Fortunately the men had been well inoculated against enteric before joining the camp.

A. A.

HOFFMANN (W. H.). **Chrysops Guiterasi.**—*Rev. Med. y Cirug. Habana.* 1923. Sept. 10. Vol. 28. No. 17. pp. 587–594. With 1 fig.

Discursive remarks on the habits and local distribution of Chrysops. Description and figure of *Chrysops guiterasi* described originally (in the *Bulletin of Entomological Research*, 1923, Vol. 13, p. 401) by BRUNETTI, not by "Bruner" as stated in this paper.

A. A.

SWYNNERTON (C. F. M.). **The Relation of some East African Tsetse Flies to the Flora and the Fauna.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 128–141. With 19 figs.

It is well known that tsetse-flies are vitally dependent on shade, and considerably dependent on large mammals, though it is not so generally realized that each species has its own particular requirements in the way of shade in itself and in its associated large animals.

So far as East Africa is concerned the author distinguishes the following types of shade: (1) "Primary forest"—the forest primeval where the trees may be more than 200 feet high; (2) "Savannah"—which may be open grassland, or scrub, or light woodland, the first being due to conditions of the soil inimical to trees, or to continual grazing, or to native settlement; and all being stereotyped by annual grass fires in the dry season; (3) "Secondary thicket" where, as a result of too-early fires before the grass is dry as tinder, an open savannah becomes beset or even completely overwhelmed by heavy thickets and coppice; (4) "Desert formations," a sort of tropical steppe or bad land, too poor for any grass growth luxuriant enough to be affected by fires; (5) "Fringing associations," of very varied forest composition and of varying breadth, bordering lakes and streams and swamps: these waterside belts sometimes harbour *Glossina palpalis* and *brevipalpis* permanently, and *morsitans* during the rigours of the dry season: it has been suggested that the clearing of these alone might be enough to clear fly from a given area.

As regards the specific shade requirements of different East African tsetse-flies, *G. brevipalpis* haunts heavy thicket more or less overshaded; *G. palpalis* is a fly of waterside shade, which must here and there at least be dense; *G. austeni* is a heavy thicket fly; *G. pallidipes* affects the lighter type of thicket, not overshaded, and ranges farther afield in search of food than any other species known to the author; *G. morsitans* is a savannah-woodland and scrub fly, tending to congregate in the dry season at moist and shady spots; *G. swynnertoni* inhabits savannah with abundant thickets.

As regards relations to man, *G. palpalis* notoriously attacks the waterside populations; *G. pallidipes*, *morsitans*, and *swynnertoni* all come in contact with man, but *G. brevipalpis* is not aggressive.

In respect of the conjectured effect upon tsetse-flies of destruction of game, *G. palpalis* can fall back on reptiles and on man; and *G. morsitans* and *swynnertoni* could get on quite well with bush-pig, an animal which it would be impossible to exterminate, and they also would attack man. Apart from any questions of difficulty and expense and finality, the author is of opinion that tsetse cannot be either exterminated or precluded from infection by destruction of game. In the case of *G. morsitans* destruction of game in the dry-season concentration points of the fly might have some effect, direct or indirect.

A. A.

SWYNNERTON (C. F. M.). **Tsetse-Flies Breeding in Open Ground.**—*Bull. Entom. Res.* 1923. July. Vol. 14. Pt. 1. p. 119. With 1 plate.

On two occasions, in an open piece of ground near savannah woodland but itself quite devoid of overhead shade, the author found puparia of *Glossina morsitans*, associated on one occasion with a few of *G. pallidipes*. The author notes as a significant point that a high proportion of the pupae were dead.

A. A.

MACFIE (J. W. S.). **Report on the Distribution of Tsetse-Flies in the Neighbourhood of Accra.**—*Bull. Entom. Res.* 1923. July. Vol. 14. Pt. 1. pp. 25–29. With 2 plates and 1 map.

G. palpalis and *G. longipalpis* were found all along the hills to the west and north of the Accra plain; but the plain itself, except near the hills, is free from them.

A. A.

JACK (Rupert W.). **Tsetse Fly. A Four Years' Experiment in Game Elimination.**—*Rhodesia Agric. Jl.* 1923. Apr. & June. Vol. 20. Nos. 2 & 3. pp. 207–223. With 1 map; 329–348.

The subject of this interesting report is described as an experiment, though it is far from strict conformance with experimental methods. The author introduces his account with something of an appreciation of the view that tsetse-flies will naturally disappear with the extermination of game, a view that he seems to regard as demonstrated by the disastrous effects upon *Glossina morsitans* of the rinderpest epidemic of 1896 which in certain parts of S. Africa nearly exterminated the buffalo.

The area selected for the operations here described lay a few miles on either side of the Shangani River (about Lat. 18°S.) in the last 30 miles of its course—a forest tract with much game and a very thin and scattered population. In 1910 this area was free from fly (*Glossina morsitans*); by 1913 fly were established; in 1919 fly had spread to all the suitably shady parts of the forest. During four years' operations (1919-1922) 3,390 head of game were killed, and no doubt game generally fled from the disturbed area. "As the operations continued the tsetse-fly [*G. morsitans*] greatly decreased wherever comparative observations were made, and by October 1922 it had practically disappeared from a considerable tract." Concurrently with decrease of fly within the disturbed area the advance of fly continued in the undisturbed country outside it.

The compared observations on which these conclusions seem to be based were not continuous [and do not seem to have been made at any fixed and conditioned stations], but were made during brief visits. The area was visited every year in the month of October, that being a month when the fly tends to concentrate and the mornings are sunny. It was visited also in May of 1919 and 1921, in June of 1921 and 1922, in July of 1919 and 1922, and in August of 1920. Some stress is laid upon the October comparisons, though at the same time "it is to be emphasized that no claim is made that observations made in October of each year are accurate estimates of density of fly."

A. A.

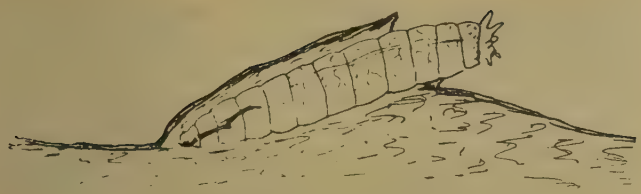
Blacklock (B.) & Thompson (M. G.). **A Study of the Tumbu-Fly,** *Cordylobia anthropophaga* **Grünberg, in Sierra Leone.** *Ann. Trop. Med. & Parasit.* 1923. Dec. 21. Vol. 17. No. 4. pp. 443–510. With 5 text figs., 1 graph and 4 plates. [34 refs.]

This valuable study of the Tumbu fly and its doings is remarkable for its completeness ; it fills in many gaps in our knowledge of the life-history of the insect and gives us a connected history of the subject. The authors emphasize the fact, that the breeding flies that provided the material for the study were captured in the dry season, whereas the myiasis in man, for which the fly is responsible, occurs in the wet season and consequently has led some writers to suppose that the flies themselves are restricted to the wet season. From their own investigations the authors offer two explanations of this apparent incongruity : one is that the wild rat is the principal natural host of the larvae of the fly, and that when, in the wet season, the wild rats are flooded out of their burrows and seek the shelter of dwellings, the pregnant flies follow them ; the other is that the fly objects to a wet medium for the deposition of its eggs and therefore, during the wet season, itself seeks artificial shelter for that purpose. Although the pregnant female objects to a wet site for her eggs, the adult flies can stand a good deal of damp and cold ; but they are killed in 15 to 30 minutes by direct exposure to midday sun in a test-tube, and this explains why they may come into houses in the hot season without any intention of depositing their eggs there.

The female fly (in the laboratory) lives 14 to 15 days. Pairing occurs very soon after emergence. The select site for deposition of eggs is *dry* sand that has been contamination by animal excreta. A female may produce at least two batches of eggs at about 3 days' interval—up to 300 in the first batch and to 184 in the second—and dies 2 to 5 days afterwards.

The egg in a room usually hatches in 3 days, in an incubator at 37° C. in 1 day. It is killed by prolonged exposure to sun (4 days), but not by 48 hours in the ice-chest. Light ironing under three folds of cotton cloth (such as it would get in a laundry if eggs were deposited on drying clothes) is fatal.

The three stages of the larval life are described. The new-hatched larva is 0·75 to 1 mm. long. It is elongate spindle-shape, has a median mouth-hook, adapted for piercing skin, as in Hypoderma, and has numerous (14) tentacle-like processes at its posterior end. The cutaneous spinules are limited to restricted areas, and those of the last 3 segments are directed forwards. These young larvae become active only if disturbed. If left at room temperature they live for about 9 days—exceptionally 15 days. They can stand direct sun for two hours, and lived only 3 days in an incubator at 37° C. Twenty hours on ice did not hurt them, nor did complete submersion for long terms (up to 24 hours in one instance). Laundry treatment, as already described, is fatal. Penetration of the host's skin is effected *only* in this first stage, when the necessary median mouth-spine is present. The act takes from 25 seconds to 25 minutes, according to the thickness of the particular skin, and hardly attracts attention. Larvae will attack a cadaver and may complete their 1st stage in that situation ; but if an animal harbouring larvae of the 2nd or 3rd stage dies, the larvae escape and bury themselves in the soil ; or if they remain in the dead body they die. Oily applications are very obstructive to penetration by larvae. About the third day after penetration the larva moults.



First instar larva of *Cordylobia anthropophaga* penetrating skin.
[BLACKLOCK and THOMPSON.]
[Reproduced from the *Annals of Tropical Medicine & Parasitology.*]

The larva of the 2nd stage is 2·5 to 4 mm. long and is club shaped. The cuticular spines are more disseminated over the anterior half of the body, the tentacle-like processes at the after end of the body are very much reduced, the usual paired mouth-hooks are present. About the 5th or 6th day the second moult occurs.

The larva of the 3rd stage becomes full grown about the 7th or 8th day. [Its features are sufficiently well known.] Though the entire span of larval life is thus 7 or 8 days, its duration is influenced by the degree of suitably of the host.

On exit from host the larva burrows in the soil out of sight, to pupate. The adult issues from the pupa-case in 10 or 11 days. Pupae kept in an incubator for 14 days at 37° C. did not afterwards give issue to adults, and it was inferred from experiment that this was the effect of heat, not of drought. Of 12 pupae kept for 3 weeks in an ice-chest, 9 emerged 5 days after release from the ice-chest.

In nature, although mammals of many species act as hosts to the larva of the Tumbu fly, the authors consider the wild rat to be its principal support ; on making search they found living pupae in rat burrows. ROUBAUD, like others, has fixed upon the dog as the chief natural host and has recommended attention to dogs as the most promising prophylaxis. The authors agree that since the dog is a very frequent and ready host, and, unlike the wild rat, has no permanent entrenchments, there is something, though not all that is desired, in ROUBAUD'S recommendation.

Babies and puppies are more susceptible than adult individuals to Cordylobia myiasis. The authors' observations and experiments suggest and in part support, though they do not infallibly confirm their theory, that some of the relative immunity enjoyed by older individuals may be an acquired immunity ; at any rate, they have experimental evidence that larvae do not always develop after getting through the host's skin, and that in some such cases (though in others they "encountered certain paradoxical results") there had been a prior tumbu infection. The matter is most certainly worthy of continued investigation.

The much-debated question of the mode of infection of man is discussed. The authors think there is something in the latrine theory, since the sand used there might contain larvae of the first stage and some of it might be spilt on the seat. Again, they know that a hard-pressed fly may lay its eggs on cotton, and they know of a case of tumbu myiasis that could be traced to the use, as a bandage, of a piece of clean cloth that had been left lying for some time ; they do not think,

however, that much is to be feared from clothes just come home from the washing, since any possible infestation would have been destroyed in the laundering. Natives lying on infested soil are obviously open to attack.

It is not amiss to draw attention to the authors' emphatic endorsement of a respectful attitude towards native accounts, however strange, of purely *natural* phenomena. The authors tell us that about the year 1862 the natives of Senegal gave certain Europeans a perfectly correct account of the natural history of tumbu myiasis; they quote the native report as well as the bland incredulous phrases of the European reporters.

A. A.

DAVIS (L. L.). **Myiasis of the Ear.**—*U.S. Nav. Med. Bull.* 1923. Sept. Vol. 19. No. 3. pp. 345–348.

Two cases of myiasis of the ear are here recorded; in both, a fly actually invaded the auditory canal; and in both, there was a past history indicative of some slight inflammation of the canal [that might possibly have made the canal attractive]. In both, the first symptoms, appearing the day after the removal or voluntary exit of the fly, were boring pain and a "sizzling" in the ear, and the first examination revealed maggots in the tympanum as well as the external auditory canal. Instillations of a lotion of equal parts of chloroform and milk immediately killed the larva and relieved the symptoms; but before this treatment was adopted injections of 1 in 1000 $HgCl_2$ solution, irrigation with warm boric lotion, instillation of 5 per cent. carbolized oil, of pure mineral oil, and of 10 per cent. solution of chloroform in milk had been tried without effect.

The maggots were not identified, but were thought to be *Cochliomyia macellaria*. In both cases many larvae were washed out, in one case 190 were counted.

A. A.

GEDOELST (L.). **Note sur la larva du** *Gastrophilus haemorrhoidalis* **et description de la larve d'une nouvelle espèce africaine.**—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Aug. Vol. 1. No. 3. pp. 269–275. With 3 figs.

The author makes known that the Oestrid larva from African Equidae, hitherto identified with *Gastrophilus haemorrhoidalis* Bauer, is not that species at all, but is a "new" species, now and here figured, and described as *Gastrophilus pseudohaemorrhoidalis*. This new species seems to be restricted to Africa, where it has an extensive range.

For comparison the larva of *G. haemorrhoidalis* Bauer, which is a Palaearctic and Nearctic species and does not occur in Africa, is also figured and described.

A. A.

ROOT (Francis Metcalf). **Notes on Larval Characters in the Genus Sarcophaga.**—*Jl. Parasit.* 1923. June. Vol. 9. No. 4. pp. 227–229. With 1 plate.

The maggots of Sarcophaga are distinguishable by their posterior stigmatic or spiracle plates. The peripheral ring of these plates is broadly incomplete at the lower inner corner. The spiracle clefts also approach the vertical. The author finds that he can distinguish two types of stigma and spiracle in Sarcophaga maggots; in the one, exemplified by *S. communis*, the inner side of the ring is nearly vertical, and ends in a knob,

and the spiracle clefts are narrow and are crossed by a large number of anastomosing bars; in the other, exemplified by *S. ochracea*, the inner side of the ring has a strong centripetal curve which tapers to a point, and the spiracle clefts are broader and crossed by fewer bars. Specific differences can also be observed in the anterior spiracles, in Sarcophaga.

A. A.

i. SAITO (Tokio). [**Ueber die Myasis interna und einige Experimente ueber die Larve von Sarcophaga carnaria.**] —*Ig. Chuo Z.* Tokyo. 1921. Vol. 18. pp. 1445–1449. With 1 fig. [Summarized in *Japan. Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 1. p. 66.]

ii. PATTON (W. S.). **The Identification of the Larvae of the Diptera (Flies) which cause Naso-Pharyngeal and Aural Myiasis in Man.** *Jl. Laryngol. and Otol.* 1923. Jan. Vol. 38. No. 1. pp. 18–27. With 19 text figs.

iii. GALLI-VALERIO (B.) & DE WERRA (M.). **Premier cas d'infection à *Hypoderma bovis* de Geer chez l'homme en Suisse.**—*Schweiz. Med. Woch.* 1923. July 25. No. 30. pp. 701–702. [7 refs.]

i. Larvae of flesh-fly, *Sarcophaga carnaria*, found in faeces of an acute diarrhoea case. [Experiments not recorded in the summary.]

ii. This useful paper covers a considerable part of the author's paper in the *Bulletin of Entomological Research* for Nov. 21 (see this *Bulletin*, Vol. 19, p. 486).

iii. The parasite was identified as a larva of *Hypoderma bovis* in its second stage. The tumour, which was quite like a bovine "warble," was situated behind the mastoid region and was extremely painful. There was no history of any signs of migration.

A. A.

FERGUSON (E. W.). [**Fleas.**]—*Australian Zoologist.* Sydney. 1923. June 7. Vol. 3. No. 3. pp. 114–118. With 1 plate. [Summarized in *Rev. Applied Entom.* 1923. Sept. Vol. 11. Ser. B. Pt. 9. pp. 150–151.]

Deals with the 33 known Australian species. The human flea (*Pulex irritans*) commonly infests pigs and probably develops on the hedgehog. The cat and the dog flea are of universal distribution. The rat flea, *Xenopsylla cheopis*, exists in Sydney, Queensland and West Australia, but its further range has not been ascertained. The European rat-flea, *Ceratophyllus fasciatus*, is common in the South of Australia. Another rat flea, obtained from Franklin Island, is *Xenopsylla nubica*. *Ctenopsylla musculi* is of little importance. The ubiquitous *Echidnophaga gallinacea*, which appeared in Western Australia two years ago, is now a serious pest, attacking poultry, dogs, horses, and even man. *Echidnophaga myrmecobii*, a parasite of the rabbit in New South Wales and of the rat in South Australia, may also spread.

A. A.

DUNN (Lawrence H.). **Fleas of Panama, their Hosts and their Importance.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. July. Vol. 3. No. 4. pp. 335–344. [1 ref.]

The fleas here recorded are *Pulex irritans* (not very common), *Xenopsylla cheopis*, *Ctenocephalus felis* (very common), and *C. canis* (found once on a dog). *Rhopalopsyllus dunni* (on jungle rats), *R. klagesi* (on spiny rats) and *R. cacicus* (on anteater and ocelot). *Dermatophilus penetrans* and *Echidnophaga gallinacea*.

The common rats are the ubiquitous *Mus norwegicus*, *rattus*, and *alexandrinus*. *M. rattus* is extending its range into the jungle; even *M. norwegicus* has taken to the bush to some extent; and thus there may be exchanges of fleas between the indigenous jungle-rats and them.

A. A.

VAN STEENIS (P. B.). **Enkele gegevens over** *Loemopsylla cheopis* **en** *Pygiopsylla ahala* **in verband met de epidemiologie der pest.** [Some Facts about *L. cheopis* and *P. ahala* in Connexion with the Epidemiology of Plague.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 4. pp. 570–596. With 1 chart. [8 refs.]

The flea index depends largely on the place where the rats are caught: in godowns as a rule it is higher (11–16·8) than in human dwellings (1·6–2·4). The author explains this by the more favourable breeding conditions of the flea in the godowns (dust, darkness, humidity, lack of ventilation). There exists a periodical variation of the flea index concurrent with probably the seasonal recurrence of plague. The index of *L. cheopis* did not reach its summit in the wet season; the production of larvae is independent of changes in humidity and temperature as observed at Soerakarta (Java). There is no sufficient proof of the existence of secondary flea concentration, *i.e.*, concentration of the fleas on the surviving rats during an epizoötic.

Pygiopsylla ahala is not a typical out-door flea, as asserted by OTTEN. In the plain the rats' nests in human dwellings are too dry, but at greater altitudes (above 1,000 M.) the humidity is sufficient to warrant a regular breeding of this flea.

The author supports SWELLENGREBEL's criticism (see this *Bulletin*, Vol. 20, p. 360) of HYLKEMA's views of the importance of the human flea in the epidemiology of plague (*l.c.*, Vol. 19, p. 373) and offers further argument for this criticism.

W. J. Bais.

CRAGG (F. W.). **Observations on the Bionomics of the Bed-Bug,** *Cimex lectularius* **L., with Special Reference to the Relations of the Sexes.** *Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 449–473. [5 refs.]

The author's account of the astonishing sexual phenomena displayed by the bed-bug have been noticed in this *Bulletin* (Vol. 18, p. 26): the present paper records a mass of detailed observation under ingenious experimental conditions in attempts to discover the functions and the fate of the constant streams of spermatozoa, so greatly in excess of the requirements for simple fecundation of ova, by which the body-cavity of the insect is inundated. The experiments, though they did not elucidate the secondary functions of the sperm, showed at least that they are not merely stored up, since after a single union with a male a feeding female cannot produce anything like a normal complement of eggs, and after having produced to the limit of her capacity is—so far as very thorough examination of spermathecae and oviduct and ovarioles goes—quite clean of spermatozoa; moreover, if a female that has been fertilized is starved for a sufficiently long term she does not resume egg-laying when feeding is resumed. These observations, as the author remarks, tend to justify in some measure BERLESE's idea of hypergamesis.

A. A.

BLACKLOCK (B.). **A Pyrrhocorid Bug Capable of biting Man.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 337–345. With 1 text fig. [15 refs.]

The bug in question is the omnivorous *Dysdercus superstitiosus*, a congener of the notorious "cotton-stainers" (which damage other crops besides cotton). The author describes how he was bitten by *Dysdercus superstitiosus*, and goes on to consider not only its history and habits, but also its infective potentialities, and the pathogenic significance of Hemipterous insects in general, in a very interesting paper.

A. A.

BRUG (S. L.) & HAGA (J.). **Verslag een onderzoek naar de geschiktheid van "Lotol" als middel ter verdelging van wandluizen bij toepassing van de hierbij verstrakte spray.** [Report on the Suitability of "Lotol" as an Eradicator of Bugs, when applied with the Spray delivered with it].—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 4. pp. 641–642.

"Lotol" is a brown aromatic liquid. When applied with the spray it kills the larvae, but the imagines only if they are wet all over. If applied to infested furniture it does not sufficiently reach the bug hidden in crevices.

W. J. Bais.

MACARTHUR (W. P.). **Tick Paralysis.**—*Jl. Roy. Army. Med. Corps,* 1923. Aug. Vol. 41. No. 2. pp. 81–86. [14 refs.]

The object of this paper is to direct attention to tick-paralysis, as an accident which, not being of obtrusively obvious causation, may possibly be of much wider occurrence than is at present supposed. The author also records short notes, supplied by Dr. A. C. NASH, of British Columbia, of four cases. In one of these (a presumed case) a wood-tick was found on a child who had died suddenly; in another a drowsy and paralysed child rapidly recovered when a wood-tick was found (on its neck) and removed; in another case two wood-ticks were found on the back of the head of a child who had died in forty-eight hours; in another case a man suffering from paralysis made a rapid recovery when a wood-tick that was found embedded in his groin was removed. The ticks sent to the author as those to which "the cases seemed to be traceable" were *Dermacentor venustus.*

A. A.

MACKENZIE (J.). **Acari in Specimens of Urine.** [Correspondence.]—*Jl. Roy. Army Med. Corps.* 1923. Aug. Vol. 41. No. 2. pp. 157–158.

With reference to the cases in which mites were discovered in urine in patients suffering from urinary troubles (see this *Bulletin*, Vol. 20, p. 473) the observer, after carefully controlled investigations, found that mites were obtainable only from urine sent to the laboratory in bottles, and that bottles taken from their packing of hay or straw might contain specimens of Tarsonemus, Glyciphagus, and Tyroglyphus. From one bottle Glyciphagus, alive and dead, and in all its stages, was obtained. "It would appear," therefore, "that the occasional presence of acari in specimens of urine is due to the hay or straw sometimes used in packing glassware and to the resistance of chitin to the action of heat and chemicals."

A. A.

ESCOMEL (E.). **Les Pseudo-méloïdes du Pérou et la Pseudoméloïdine. Emploi de ces insectes en thérapeutique à l'epoque des Incas.** —*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 615–621.

This paper supplies a digestible account of the blister-beetles of Peru, several species of which are briefly characterized. Some of the physical and chemical properties of their blood, of which cantharidin is either the sole or the chief active principle, are described, as well as its vesicant effects when applied in the fresh state to the skin of animals. The blood, squeezed from the fresh-killed beetle, has been used in Peru, from the days of the Incas, for the removal of warts and corns.

A. A.

PAILLOT (A.). **Sur une technique nouvelle permettant l'étude vitale du sang des insectes.**—*C. R. Soc. Biol.* 1923. Apr. 21. Vol. 88. No. 13. pp. 1046–1048.

By the application to invertebrate blood of Doyon's method of rendering vertebrate blood incoagulable the author has made some elegant and interesting observations on caryocinesis, and the behaviour of parasitic flagellates in the blood of a caterpillar, and has been able to provoke waves of caryocinesis by inoculation of harmless microbes, peptones, and various albuminoid substances. Doyon's method of preventing coagulation without sensibly altering the composition of the blood depends on the action of nucleic acid. The author employed nucleic acid extracted from the mesenteric ganglia of the ox, making an alkaline solution of 2 per cent. nucleic acid, 0·5 per cent. carbonate of soda, and 0·4 per cent. sodium chloride. One drop of this solution was injected into the body-cavity of a caterpillar (of *Agrotis pronubana*).

i. RUSSO (—). [**Prolégomènes à l'étude des rapports entre la nature des terrains et le développement des parasites humains au Maroc.**]—*Bull. Soc. Sci. nat. Maroc.* Rabat. 1921. Dec. 31. Vol. 1. No. 7–10. pp. 157–165. With 6 figs. [Summarized in *Rev. Applied Entom.* 1923. July. Vol. 11. Ser. B. Pt. 7. p. 127.]

ii. BALFOUR (Andrew). **Modern Weapons against Insect-borne Diseases.**—Reprinted from *Medical Press and Circular.* 1923. Aug. 22 & 29. 20 pp. [53 refs.]

iii. GLADSTONE (H. B.). **The Harvest Bug.** [Memoranda.]—*Brit. Med. Jl.* 1923. Sept. 8. p. 415.

iv. KISHIDA (Kiukichi). [**An Interesting Mite excreted with the Human Urine.**]—*Dobutsugaku Zasshi.* 1921. Vol. 33. No. 398. pp. 438–443. With 4 text figs. [Summarized in *Japan Jl. Zool.* Tokyo. 1922. Vol. 1. No. 1. (Abstracts.) p. 9.]

i. These prolegomena from Morocco illustrate the argument that the local distribution of human parasites is influenced by the local topography and physiography.

ii. This is a concise and readable summary of the multifarious methods for the control of mosquitoes that have been employed or proposed during recent years. Some novel experiments for destroying fleas and tsetse-flies also receive comment.

iii. In the treatment of the irritation caused by the Harvest-mite the author recommends the application of methylated spirit, in the early stage of itching, or 1 per cent. carbolic lotion well rubbed in. These are better than the messy though effective sulphur ointment.

iv. Merely gives the name *Tetranychina tuberculata.* [The species of this genus of the "red spider" family live upon plants.]

A. A.

MONTANA. **The Montana State Board of Entomology. Fifth Biennial Report 1922-23.** [COOLEY (R. A.), Secretary.]—32 pp. With 2 charts & 1 fig.

An increase of the number of cases of Rocky Mountain spotted fever having occurred in 1921, the United States Public Health Service came to the aid of the local State Board of Entomology and among other things established a field station for research in the Bitter Root Valley. The Biological Survey has also continued its co-operation. Another devoted person—making now the fourth—engaged in the investigation of the disease became infected and died. The Rodent Control regulations have been continuously enforced, but although ten species of rodents are known to be susceptible and to be capable of infecting ticks, the work of destruction has been concentrated on the Columbian ground-squirrel, since besides being the chief comforter of immature ticks, it is also a serious pest of agriculture. By the regulations the State bears the cost of survey and administration, and the landowner the cost of the poison and the labour of setting it ; the weak point of this arrangement is the anxiety of the landowner to keep his share of the expense down.

Experiments in the cultivation of the specific organism in tissue cultures have been continued, at Harvard. The organisms were found to grow as long as the tissue cells of the culture survived.

A. A.

FAUST (Ernest Carroll). **Practical Parasitology in South China.**—*Jl. Trop. Med. & Hyg.* 1923. Sept. 1. Vol. 26. No. 17. pp. 273–275.

The author complains that notwithstanding the magnificent lead given long ago by MANSON in Amoy, our knowledge of the parasitology of Southern China is far behind that of Indo-China and of the Loo Choo Islands and Formosa, and he also laments that Medical Entomology in China has been entirely neglected. Little is known about the varieties of malaria existent. Relapsing fever is common in spring in the central Yangste valley, but it has not been sufficiently studied there nor is its incidence elsewhere known. Little information is available as to the occurrence of broncho-spirochaetosis and the incidence of yaws. It is quite possible that coccidiosis, kala azar, and Japanese river-fever occur in Southern China, but no exact knowledge of these matters exists. Tapeworms are rarely reported, but how much this may be due to lack of observation is a question to be asked. Trematodes are common in certain places, but the manner of dissemination and the exact distribution of the different species has still be be ascertained. The same may be said of the roundworms ; and the reason why microfilariae are so seldom present in the blood of elephantiasis patients in Southern China has still to be explained.

A. A.

CHANDLER (Asa C.). **Speciation and Host Relationships of Parasites.** —*Parasitology.* 1923. Sept. Vol. 15. No. 3. pp. 326–339. [24 refs.]

A speculative paper, interesting but not qualified for abridgement. The author seems to incline to the view that the little if constantly differing forms of a specific parasite occurring in different species of

hosts of the same class, or in different regions of the body in the same species of host—forms such as the various sarcoptes, itch-mites and Trichomonas, etc., etc. to which specific names have been applied—are better regarded as races—host races—of a single zoological species.

A. A.

LOTKA (Alfred J.). **Biometrics.—Contribution to Quantitative Parasitology.**—*School of Hygiene & Public Health. Johns Hopkins Univ. Collected Papers.* Vol. 4. No. LXXVIII. Reprinted from *Jl. Washington Acad. Sci.* 1923. Apr. Vol. 13. No. 8. pp. 152–158. With 2 figs. [6 refs.]

The problem of quantitative parasitology here considered in set mathematical terms is the calculation of the quantitative relations subsisting at any time between a population of host organisms and a specific parasite organism preying upon it. It is a paper only for those who believe with HOBBES that geometry is the only Science that it hath pleased the divine powers hitherto to bestow on mankind.

A. A.

CAIUS (J. F.) & IYENGAR (K. R. K.). **Notes on the Concentration of Anti-Cobra Serum. I. Concentration** *in vacuo* **and Dilution.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 601–609. With 2 charts. [3 refs.]

The antivenene used in the experiments here recorded was the Kasauli antivemon (Cobra & Russell's viper). Its cobra-neutralizing power was standardized for the animals used (pigeons) and the effect upon it of concentration by drying *in vacuo* was investigated. It was found that it might be reduced to two-thirds its original bulk without any increase of potency per cc., and that by further concentration to *one-fourth* its original bulk a final product of only *twice* the original potency was obtained. There is thus ultimately an apparent loss of cobra-neutralizing power in the course of concentration—but only apparent, because by diluting the concentrated product up to the original volume the whole original potency is then revived. The hypothetical explanation is that during the process of concentration an " antivenene-protein-aggregate " is formed which inactivates part of the antivenene and is resolved into its component parts again when the concentration is sufficiently diluted. Experiments designed to find support for this hypothesis showed not only that the Kasauli antivemon may be diluted with its own volume of water or saline without any change of total potency, but also—in confirmation of the observations of BRAZIL and of HOUSSAY and NEGRETE with other antivemonous sera—that dilution often enhances the total potency. The authors' practical conclusions for this antivemon are that a two-fold increase of potency against cobra-venom (which is all that could be obtained in these experiments) is of little value ; and that in the treatment of cobra-poisoning it is advisable to dilute it with its own volume of distilled water, or of saline, in order, without diminishing its neutralizing power, to lessen the danger of serum sickness.

A. A.

MYLREA (C. Stanley G.). **A Note on the Treatment of Scorpion Sting and the Sting of Venomous Fishes in Arabia.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 210–211.

For the treatment of the sting of the species of scorpions of which the venom is not dangerous the author recommends a juxtaposed injection of 3 grains of novocaine in 5 to 15 minims of adrenaline solution. Similar treatment he has found efficacious for the sting of some of the venomous fishes.

A. A.

i. CLEVELAND (L. R.). **Correlation between the Food and Morphology of Termites and the Presence of Intestinal Protozoa.**—*Amer. Jl. Hyg.* Baltimore. 1923. July. Vol. 3. No. 4. pp. 444–461. [5 refs.]

ii. DELANOË (P.). **Au sujet du Parasitisme dû à la Limnatis nilotique du Maroc.**—*Maroc-Médical.* 1923. Aug. 15. No. 20. pp. 242–243.

iii. MILTON (Frank). **Note on the Molluscan Hosts of the Human Schistosomes.**—*Jl. Trop. Med. and Hyg.* 1923. June 15. Vol. 26. No. 12. pp. 211–213. [12 refs.]

iv. GALLI-VALERIO (B.). **Parasitologische Untersuchungen und Beiträge zur parasitologischen Technik.**—*Cent. f. Bakt.* I. Abt. Orig. 1923. Oct. 31. Vol. 91. No. 2. pp. 120–125. With 3 figs. [5 refs.]

i. The author has examined, for intestinal parasites, practically all the termites in the U. S. National Museum, and all his observations indicate that in a colony those castes that feed solely on wood harbour intestinal protozoa, and those castes that rarely or never feed on wood do not harbour them.

ii. The author draws attention to a former paper of his on the subject of the trouble caused to man and beast in Morocco by the freshwater leech *Limnatis nilotica*, and on the manner of ridding cisterns, etc., of these leeches by introducing eels.

iii. This paper deals with perplexities of zoological nomenclature.

iv. A miscellany of parasites and hosts are mentioned here, mostly merely by name and without arrangement, occasionally with some discursive remarks. New species of Nosema and Eimeria are introduced, each in a few lines, amid these jottings.

A. A.

ASHWORTH (J. H.) & TURNER (A. Logan). **A Case of Rhinosporidiosis.**—*Edinburgh Med. Jl.* 1923. Aug. N.S. Vol. 30. No. 8. pp. 337–351. With 3 plates. [20 refs.] See this *Bulletin*, Vol. 20, p. 451.

BACH (F. W.) & KIEFER (K. H.). **Ueber die Verbreitung parasitischer Darmprotozoenarten des Menschen innerhalb Deutschlands.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Vol. 27. No. 5. pp. 145–169. [35 refs.]

BAQUÉ (B.) & KIEFFER (J. J.). **Existence de *Stegomyia fasciata* au Sahara, à 500 kilomètres de la côte mediterranéenne.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1923. May. Vol. 3. No. 2. pp. 169–171.

BARRAUD (P. J.). **A Revision of the Culicine Mosquitoes of India. Parts III, IV and V.**—*Indian Jl. Med. Res.* 1923. July. Vol. 11. No. 1. pp. 214–219; 220–223; 224–228. With 4 plates.

BOGROW (S. L.). **Die Kriechkrankheit (Creeping Disease, *Larva migrans*). *Gastrophilus cutis*.**—*Dermat. Woch.* 1922. June 3. Vol. 74. No. 22. pp. 519–523.

BRÈTHES (J.). **[Un *Phlebotomus* nuevo para la República Argentina (*Phlebotomus cortelezzii*)].**—Reprinted from *La Semana Med.* Buenos Aires. 1923. No. 8, 12 pp. With 3 figs.

BRUG (S. L.) & HAGA (J.). **Aanteekeningen omtrent muskieten.** [Notes on Mosquitoes.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 4. pp. 635–640.

CAVASSA (Nicolas E.). **Algunas observaciones sobre el estegomyia calopus. Comunicación presentada al Sexto Congreso Médico Latino Americano reunido en la Habana (Cuba).**—*Cronica Méd.* 1922. Nov. Vol. 39. No. 713. pp. 484–488.

CHRISTOPHERS (S. R.). **The Geographical Distribution of the Anophelini.**—*Trans. 4th Congress Far Eastern Assoc. Trop. Med.* 1921. Vol. 1. pp. 421–430.

CLARK (Francis). **An Address on Man's Insect Enemies.**—13 pp. Hong Kong: Printed by Noronha & Co., 3, Wyndham Street.

COOLING (L. E.). [**On the Larval and Pupal Stages of** *Myzorhynchus bancrofti*, **Giles, 1902.**]—*Proc. R. Soc. Queensland, 1921, Brisbane.* 1922. Jan. 16. Vol. 33. pp. 166–173. With 1 text fig. [Summarized in *Rev. Applied Entom.* 1922. Oct. Vol. 10. Ser. B. Pt. 10. p. 204.]

CORNWALL (J. W.). **On the Structure of the Salivary Pump in Certain Blood-Sucking and other Insects.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 996–1007. With 6 plates and 15 figs.

DA CUNHA (Aristides Marques) & PACHECO (Genesio). **Sobre os flagellados intestinaes do homem.**—*Brazil Medico.* 1922. Dec. 2. Year 36. Vol. 2. No. 48. p. 349.

GAMBIER (A.). **Un cas probable de pseudo-myiase rampante.**—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 1018–1019.

HEGNER (Robert W.). **Nuclear Division within the Cysts of the Human Intestinal Protozoon** *Chilomastix mesnili.*—*Amer. Jl. Hyg.* Baltimore. 1923. May. Vol. 3. No. 3. pp. 349–353. With 9 text figs. [3 refs.]

HISIKARI (Saneo). [**On the Poisonous Fishes found in the Marshall Islands.**]—*Nihon Biseibutsugakkwai Zasshi* (*Jl. Japan Microbiol. Soc.*). 1922. Dec. Vol. 16. No. 12. [Summarized in *Japan Med. World.* Tokyo. 1923. Apr. 15. Vol. 3. No. 4. p. 83.]

IYENGAR (M. O. Tirunarayana). **The Larva of** *Anopheles annandalei.* **Prashad.**—*Indian Jl. Med. Res.* 1922. Oct. Vol. 10. No. 2. pp. 526–529. With 1 plate.

KING (W. V.) & BULL (Carroll G.). **Blood feeding Habits of Malaria-carrying Mosquitoes at Mound, La.**—*Amer. Jl. Hyg.* Baltimore. May. Vol. 3. No. 3. pp. 354.

KOFOID (Charles A.) & SWEZY (Olive). **Mitosis and Fission in the Active and Encysted Phases of** *Giardia enterica* **(Grassi) of Man, with a Discussion of the Method of Origin of Bilateral Symmetry in the Polymastigote Flagellates.**—*Univ. California Public. Zool.* 1922. Mar. 7. Vol. 20. No. 8. pp. pp. 199–234. With 4 plates and 11 text figs. [30 refs.]

KOMP (W. H. W.). **Guide to Mosquito Identification for Field Workers engaged in Malaria Control in the United States.**—*Public Health Rep.* 1923. May 18. Vol. 38. No. 20. pp. 1061–1080. With 17 text figs.

LARROUSSE (F.). **Présence de** *Phlebotomus perniciosus* **Newst. dans le départment de l'Oise.**—*Bull. Soc. Path. Exot.* 1923. Jan. 10. Vol. 16. No. 1. pp. 16–17.

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MUSGRAVE (William Everett). **Flagellate Infestations and Infections: Giardiasis, or Lambliasis; Trichomoniasis: Prowazekiasis, Cercomoniasis, Chilomastixiasis and Tetramitiasis.**—*Jl. Amer. Med. Assoc.* 1922. Dec. 30. Vol. 79. No. 27. pp. 2219–2221.

NEIVA (Arthur) & PINTO (Cesar). **Dos reduvideos hematophagos encontrados no Districto Federal e estado do Rio de Janeiro com a descripcao de uma especie nova.**—*Brazil-Medico.* 1923. Jan. 27. Year 37. Vol. 1. No. 4. pp. 45–47.

NEWSTEAD (R.). *Glossina ziemanni,* **Grünberg, a Synonym of** *Glossina palpalis* **Sub-Species** *Fuscipes,* **Newstead.**—*Ann. Trop. Med. & Parasit.* 1923. Dec. 21. Vol. 17. No. 4. pp. 533–534. [1 ref.]

NOC (F.). **Sur l'embryon acariforme et less stades larvaires des Linguatulidés.**—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 340–346. With 6 text figs. and 1 plate.

PALLARY (Paul). **Faune malacologique des eaux douces de la Tunisie.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1923. Vol. 3. No. 1. pp. 22–47. With 1 plate and 1 text fig.

PINTO (Cesar). **Anatomia, Biologia e Distribuição Geographica da** *Cellia brasiliensis* **Chagas, 1907.**—*Sciencia Med.* Rio de Janeiro. 1923. Sept. 30. Vol. 1. No. 3. pp. 143–147. With 4 figs.

——[In Portuguese and German.] **Sobre uma amoeba do genero** *Vahlkampfia* **encontrada no homen. Ueber eine Amöbe der Gattung** *Vahlkampfia* **beim Menschen.**—*Mem. Inst. Oswaldo Cruz.* 1922. Vol. 15. No. 1. [pp. 122–126 Portuguese.]. [47–49 German.] With 1 plate (9 figs.). [34 refs.]

ROBERTSON (Andrew). **Specimens from a Human Case of Infection with** *Dientamoeba fragilis,* **Jepps and Dobell, 1917.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1923. Aug. Vol. 16. No. 10. p. 48.

ROUBAUD (E.). **Sur les conditions physiologiques du zootropisme chez les moustiques.**—*C.R. Acad. Sci.* 1923. Nov. 19. Vol. 177. No. 21. pp. 1066–1068. [4 refs.]

SENEVET (G.) & EBERT (G.). **Contribution à l'étude des myiases nord-africaines. Deux cas de myiase cutanée dûs à des Sarcophaginés.**—*Bull. Soc. Path. Exot.* 1923. June 13. Vol. 16. No. 6. pp. 415–416. [3 refs.]

—— & PARROT (L.). **Présence à Sedd-ul-Bahr de** *Phlebotomus papatasi* **(Scrop).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Sept. Vol. 2. No. 3. p. 419.

SINTON (J. A.). **Notes on Some Indian Species of the Genus** *Phlebotomus.* **Part I. Introduction and Description of** *Phlebotomus annandalei,* **n.sp.**—*Indian Jl. Med. Res.* 1923. Jan. Vol. 10. No. 3. pp. 742–753. With 1 plate.

STARK (H. H.). **Ophthalmia Myiasis Externa, due to Larvae of** *Oestrus ovis.*—*Jl. Amer. Med. Assoc.* 1923. Nov. 17. Vol. 81. No. 20. pp. 1684–1685. With 2 figs.

WOODLAND (W. N. F.). *Porocephalus pomeroyi.*—*Jl. Trop. Med. & Hyg.* 1923. Feb. 1. Vol. 26. No. 3. pp. 45–46.

——**A Justification of** *Porocephalus pomeroyi,* **Woodland 1921.**—*Parasitology,* 1923. Mar. 22. Vol. 15. No. 1. pp. 39–42. With 7 text figs. [4 refs.]

REVIEWS AND NOTICES.

KNOWLES (R.). [Major, I.M.S., Protozoologist, Calcutta School of Tropical Medicine.] **Lecture Notes on Medical Protozoology.**—pp. iv + 236. 1923. Calcutta: Printed by D. N. Banerjee at the Banerjee Press, 2, Maharani Sarnamoyee Road. [Price Rs. 5 or 7/–.]

In the compass of two hundred and thirty-six pages there is here concentrated for the student of Medical Protozoology an enormous amount of information of a very practical nature. The notes are not intended to be a substitute for actual lectures, text books or practical instruction and laboratory work in Protozoology, but their object is to serve as a guide and reminder of what the student has already had explained to him more fully or has actually seen or carried out himself in the laboratory. They embrace practically everything that a medical practitioner in the tropics is required to know about the Protozoa which cause disease in man. The information given has been gathered from authoritative sources and from the author's own experience, and is presented in a clear and emphatic style, large print being used to call attention to important points or to warn the student of pitfalls which are likely to beset his path. The various books and papers dealing with any particular subject and which might be consulted with profit are indicated, and here again the student is cautioned against the use of certain literature which is likely to mislead him.

There are in all twenty lectures which deal with the Sarcodina, Mastigophora, Sporozoa and Ciliophora, which are undoubted Protozoa, while the Spirochaetes, together with the Chlamydozoa, Negri bodies, Kurloff bodies, Rickettsia and other structures of doubtful nature receive attention. The status of each group is considered, and full information regarding the pathogenicity, life histories, structure, method of examination, detection, preparation, preservation, and culture of the members of each group which parasitize man is given. Certain important forms which occur in animals and throw light on the human parasites, or are nearly related to them, are also dealt with. The important coprozoic Protozoa, which often confuse the investigator, are included. Where doubt exists regarding any point the author has expressed this clearly and boldly, and has given some indication as to problems which require solution.

Mistakes appear to be very few and far between. One such appears on page 204, where the author writes of Stegomyia as being the anopheline carrier of yellow fever. In another part he inclines to the view that *Prowazekia* is distinct from *Bodo*, while the statement that malarial parasites are not subject to phagocytosis but only their residual pigment requires some qualifications. On page 54 again the information given that there may be other intestinal flagellates of man, besides Trichomonas, Chilomastix, and Giardia, but that not one of them has yet been properly described is certainly incorrect. These are, however, minor points, and the student of Medical Protozoology can rest assured that if he keeps these lectures by his side and uses them while he is reading or working in the laboratory, he will have a trustworthy guide to help him over many difficulties and bring him to a clear understanding of a subject which often seems at first sight peculiarly confused and incomprehensible.

C. M. Wenyon.

NEATBY (Edwin A.) & NEATBY (T. Miller) [Edited by], with a Foreword by Sir James CANTLIE. **A Manual of Tropical Disease and Hygiene for Missionaries.**—pp. xix + 687. With 20 plates (14 coloured) & 118 figs. & charts in text. 1923. London: John Bale, Sons & Danielsson, Ltd. 83–91, Great Titchfield Street, Oxford Street, W.1. [Price 12/6 net.]

This book recalls the days when the earnest student purchased a "Vade mecum," a work which, in the words of "Everyman," "will go with thee through Life and be thy Guide." With one notable exception their vogue seems to have passed away. Now we have "Text Books" and "Manuals."

In order to understand the origin and contents of this Manual a quotation is necessary :—

> "The publication of this volume is made easy by the large-hearted and large-minded benevolence of the late Mrs. Honyman-Gillespie, of Edinburgh, who left by will a sum of money in the hands of trustees for the advance and dissemination of medical knowledge old and new, especially mentioning homoeopathy." (Preface.)

Thus *Homoeopathy* stands side by side with "Orthodox" methods. It is discussed in the "Introduction"; pp. 619–623 are devoted to it and at the end of each "Disease" there is a section allotted to *Homoeoptherapy*. In the "Foreword" Sir James CANTLIE writes :—"Orthodoxy in medicine is an unknown quantity, for the ebb and flow of science is with us now as it always has been, and ever will be." Be that as it may be. The reviewer does not accept, as sound, the principles upon which Homoeopathy is founded, and cannot admit that treatment with vaccines and serums is in keeping with those principles. His knowledge of the practice of Homoeopathy is nil; nevertheless if you want a shillingsworth of meat it will not avail to offer the butcher a penny. For the rest we can congratulate the Editors on their industry and its results. They have ransacked the literature of tropical medicine and made good use of the spoils; always courteously acknowledged. The section on Hygiene is practical and well illustrated. Since the manual "is intended for non-medical readers" the missionaries require something brief and dogmatic upon which they can act in emergencies or when professional medical aid is not at hand. This and more they have got. It would be hypercritical to pick out here and there small matters not free from doubt; but we cannot accept Conorhinus as a "bug" *and* a "beetle" (v. Phylum opposite p. 612). Mr. Gerald DUDGEON has contributed a very useful chapter :—Arthropoda affecting Mankind.

Full instructions are given for intravenous injections of drugs, serums and saline solutions, there is a most excellent glossary of medical and scientific terms and a good index. A word of praise must be given to the coloured plates and to the illustrations, many of them original, all well chosen.

J. H. Tull Walsh.

EDWARDS (F. W.). **Mosquitoes and their Relation to Disease. Their Life-History, Habits and Control.**—*British Museum* (*Nat. Hist.*). *Economic Series.* No. 4. 3rd Edition. 20 pp. 1923. London: Printed by Order of the Trustees of the British Museum. [Price Fourpence.]

So far as the life-history of mosquitoes goes, this little pamphlet is admirably clear and concise. It is, however, a pity—if the pamphlet is intended to serve any useful "economic" purpose—that the pages on mosquitoes and disease and those on the control of mosquitoes were not

written in consultation with a medical man having some knowledge of malaria and malaria-parasites (which the author tells us are the cause of a "tropical and subtropical disease" and were discovered in 1898) and of "elephantiasis" (which the author appears to regard as another name for filariasis), and also some practical acquaintance with sanitation in countries where mosquitoes are dangerous.

A. Alcock.

DRINKWATER (H.). **Fifty Years of Medical Progress 1873-1922.** pp. x + 183. With 37 illustrations on 35 plates. 1924. London: H. K. Lewis & Co., Ltd. [Price 10s. 6d.]

Despite its attractive title this is not an inspiring book. An era originated by PASTEUR cannot be dealt with in the manner of a dictionary, where the great creative discoveries that have brought new seas into our ken, and the brilliant explorations that have followed, are put on a level with the minor performances of the tide-watchers ashore. Taking the book as a dictionary of medical progress, however, and judging it from our own standpoint, we are bound to say that the progress made during the last fifty years in our knowledge of the causation of the diseases conveniently classed as "tropical"—progress that has had a marked influence upon medicine at large—does not receive in its pages either true diction or verity of extolment. The pregnant discoveries made by MANSON and by ROSS are certainly described as being, respectively, "of paramount importance" and "brilliant." These discoveries—in particular that of MANSON—extended the medical horizon, but even their essential facts are not here correctly or exactly stated. Under the heading *Parasites* all that we find is the single lax statement "1893. Smith and Kilburne [*sic*] showed that they can be transmitted by Arthropoda,"—nothing more, nor any supplementary references. Under *Trypanosomiasis* are confused together "Pyrosoma," yaws, and African relapsing fever; while the work of KLEINE and of KINGHORN and YORKE is unnoticed, equally with Chagas's disease and the suggestive life-history of *Trypanosoma cruzi*. Under *Snake Venom* nothing is to be found but a single extravagant general statement attributed to FRASER: the pregnant subject of antivenoms is entirely ignored. There is one obscure and imperfect reference to the connexion of lice with typhus, but nothing whatever is said about the work that has disclosed the relation between plague and rat-fleas, and among other productive discoveries entirely ignored are that by FEDSHENKO of the development of the larval guinea-worm in Cyclops; that by THOMAS of the post-embryonic development of the liver-fluke; that by MAIYARI and SUZUKI of the post-embryonic development of *Schistosoma japonicum*; and that by JANICKI and ROSEN of the early developmental stages of the ribbon-worm in certain Cyclopidae. Other obvious omissions are the absence of any allusion to the pathogenetic significance of house-flies, particularly in epidemics of typhoid, and to the ubiquity of latent human carriers of *Entamoeba histolytica*, both of which are subjects of universal interest and importance.

Though not anxious to touch matters outside the scope of this *Bulletin*, we cannot refrain from comment upon an item headed "*Immunity*" which states that nothing is definitely known about the "mechanism of immunity" and that the first experiments on immunization were made in 1886 by Theobald SMITH, and refers to METCHNIKOFF without even faint praise and to PASTEUR not at all; and also upon an item entitled *History of Medicine* that does not contain any reference to the inspiring work of Professor SINGER.

A. Alcock.